THE CHEMIST AND DRUGGIST

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Our Country and Colonial Subscribers are requested to furnish the Editor with any trade gossip that they may consider interesting.

Editorial Notes.

THE Bill to amend "The Pharmacy Act, 1868," prepared and brought in by Lord Robert Montagu and Sir Graham Montgomery, was read a second time in the House of Commons on Monday evening last, and is printed in another column of our journal. It is not a lengthy document in its present form, as it contains but one clause, the object of which is to protect the medical men of Scotland from the effects of certain regulations which were not intended to apply to them. We understand that the Pharmaceutical Council will take advantage of the present opportunity to modify the schedule which now presses so hard upon assistants who have been residing abroad. The "Case," which we print in another place, will be perused with interest by dealers in "Poisons."

Mr. Henry Matthews, F.C.S., is preparing for us an analytical report on the Quinine Wines of commerce, which will appear in our next number. Our Reports on Hair Restorers and Golden Hair Fluids have been reproduced by many of our contemporaries in England and America with encouraging comments. The manufacturer of Helmsley's American Hair Restorer acknowledges the remarkable accuracy of the analytical results published. In noticing this particular preparation, Mr. Matthews wrote: "A bottle containing 6·5 fluid ounces gave 37·8 grains of deposit, consisting of sulphate of lead, sulphate of calcium, and a small proportion of sulphur, while the residual solution gave lead corresponding to only 0·3 grains of acetate of lead. The solution also contained acetate of calcium and glycerine. The sulphur used in this case was evidently *impure milk of sulphur*, containing much sulphate of calcium, double decomposition having taken place between this last and the acetate of lead used in preparing the compound." In reference to this paragraph, Mr. Robinson, the manufacturer of the Hair Restorer, writes :—

Dear Sir,—After reading your report in the February number of your journal upon "Hair Restorers," and seeing that ours had been made with *impure milk of sulphur*, I made inquiry, and found that *this had been used by mistake*, our recipe being spirit, glycerine, pure milk of sulphur, and a small quantity of sugar of lead, scented with otto of roses Our Hair Restorer has been used for some time now, and we find it very beneficial for the time. I send you a bottle taken from the counter, as sold by us, and if you can correct the error in any future report, you will greatly oblige,

Yours respectfully,
79, Newborough-street, Scarborough. W. Robinson.

According to the *Pharmaceutical Journal*, the new Bye-Laws, adjusted to suit the altered condition of the *Pharmaceutical Society* under the Pharmacy Act of 1868, have been duly approved and confirmed by the Privy Council. The impediment which existed in the way of electing Registered Chemists and Druggists as Members of the Pharmaceutical Society under Clauses 2 and 4 of Section 1 of the Bye-Laws is thus removed, and the Council at their last meeting at once proceeded to exercise the power now given them, by electing 124 members from the class of Registered Chemists.

We have much pleasure in announcing the publication of two distinct sets of chemical labels for laboratory use, upon which much thought and labour have been expended. Messrs. Mawson and Swan's new Book of Labels has grown into shape under our editorial eyes, and we believe it is free from the defects of the work which it has superseded. It now comprises 224 separate labels, on which the new and old nomenclature and notation are displayed in a remarkably clear manner, the formulæ being printed in beautiful old-faced letters and figures. The book, moreover, contains a revised table of atomic weights, based upon that just published by Wurtz, and an explanatory introduction. The leading names on the labels are consistent with the nomenclature adopted in the latest chemical text-books, among which may be named the new editions of "Fownes," "Roscoe," and "Fresenius." The other Book of Labels has been prepared by Messrs. Matthews and Quin, whose names are a guarantee for the correctness of the work. The nomenclature adopted is that advocated by Professor Williamson, and used by many of our leading chemists; and the old and new formulæ are exhibited side by side. The collection of labels is less extensive than that issued by the Newcastle firm, the authors having systematically rejected all chemicals not actually used as analytical reagents. The two sets of labels differ essentially in the arrangement of types, and even in the nomenclature used, but they agree in being well devised and well carried out. We hope to explain their distinguishing characteristics in our review column next month.

ON WHITE GUTTA-PERCHA.

BY HARRY NAPIER DRAPER, F.C.S.*

A PAPER on "Pure White Gutta-Percha" was contributed to the Norwich Meeting of the Pharmaceutical Conference, by Mr. J. Baden Benger. There were some things so remarkable about this paper, that as I was at the time experimenting on gutta-percha, it attracted my attention. I have not, however, until now, had sufficient leisure to make the points which struck me, the subject of a connected note.

Mr. Benger, after justly observing that much of the substance formed in commerce, under the name of "white gutta-percha," is adulterated with oxide of zinc, proposes a process for the manufacture of a really pure product. This consists in dissolving the crude gutta-percha in chloroform, precipitating the filtered solution with spirit of wine, and pressing, drying, and boiling the precipitate in water.

Mr. Benger appears to have been successful; but when it is noted that, according to the data he gives, the production of three ounces of pure gutta-percha requires from five to six pounds of methylated chloroform, and about three pints of spirit of wine, the process does not appear to be very economical, nor is a practical man much reassured on this point by learning that the chloroform and spirit can be recovered; the former by the addition of water and the latter by distilation "at the leisure of the operator."

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* Communicated by the Author.

This process has not even the merit of originality, as it was patented by Dr. Cattell in 1859.*

Dr. Cattell at the same time patented other methods of effecting this object. These depended upon the circumstance that when alcohol or pyroxilic spirit is added in small proportion (the specification says one ounce to each gallon), to a solution of gutta-percha in chloroform or sulphide of carbon, the subsidence of the colouring matter is facilitated. But both Dr. Cattell and Mr. Benger seem to have overlooked the fact that the colouring matter of gutta-percha is quite insoluble in benzöl, chloroform, and sulphide of carbon, and that the alcohol of the specification acts (if at all), only by diminishing the specific gravity of the solvent, in the cases of the two last named fluids. We set out then with the proposition that all solutions of raw gutta-percha are properly speaking solutions of the pure resin only, and that the colouring matter is simply held in suspension in them. If chloroform be employed, it is possible to effect the separation either by adding benzöl so as to reduce the specific gravity, or by entangling the precipitate in some heavy insoluble powder. Carbonate of lead has thus been proposed for this purpose.† But discarding chloroform altogether, on account of its high price and specific gravity, there remains to us the choice between benzöl and sulphide of carbon. This choice is easily made. Sulphide of carbon is by far the better solvent of the two; it is quite as cheap as benzöl and is more volatile. This latter is an important advantage.

Many months since, my attention was directed to a solution of gutta-percha in sulphide of carbon, which originally used as a cement, had been put aside and forgotten. The colouring matter had formed a compact deposit at the bottom of the bottle and the supernatant liquor was of a very pale straw colour; in fact, almost colourless. I at once made a new solution and found that in a narrow bottle, the precipitate soon completely subsided. I then poured my solution upon a sheet of glass contained in a wooden frame, and allowed the sulphide to evaporate, which it does with surprising rapidity. The films of gutta-percha thus obtained were so very beautiful and so very tenacious that I showed some of them at one of the evening meetings of the Dublin Chemical Club, and described the method by which they were produced, not doubting but that this was new.

The next day, however, it was pointed out to me that I had been anticipated, and that Payen‡ had obtained a like result in the same way.

Payen, however, seems to have adopted the method merely as one of analysis, and instead of allowing the precipitate to subside, filtered the solution. I find that a solution made by dissolving one ounce of raw gutta-percha in a pint of sulphide of carbon, gives a solution from which the clear portion may be decanted at the end of three weeks. Or following Payen it may be slowly filtered through paper under a bell-jar. And if this be supported on a porcelain dish containing mercury, there will be absolutely less evaporation of the solvent than there would be from the same surface of an aqueous fluid exposed to the air. This method of filtration seems to be capable of very general application to volatile fluids.

To form thin films, the solution is evaporated on a plate of glass, but as the layer at the moment of becoming solid, is powerfully contractile, care must be taken to cut it round the edge of the glass, in order to prevent its rupture from end to end.

A film of gutta-percha thus prepared, appears, by reflected light, of a delicate creamy white, and by transmitted light has an opaline semi-transparency. It is remarkably electric, producing when rubbed between the fingers, in the dark, a flash of light. These thin films have already been put to one useful purpose, that of replacing the ground glass of the photographic camera. It is well known to photographers, that in the image formed on ground glass the most luminous and best defined portion is central, the parts outside the centre being more or less hazy. But if for the ground glass, a plain glass upon which a thin coating of the gutta-percha solution has been allowed to evaporate, be substituted, the image is found to be equally illuminated at all points. In microscopic photography, the advantage of this will be readily perceived.

Gutta-percha thus prepared is a mechanical mixture of the resin with water, which, as do most other resins, it absorbs from the air during the evaporation of the solvent. That this is the case may be at once proved by warming a glass plate bearing a film. The gutta-percha becomes perfectly transparent and adheres to the glass like a coating of varnish.

I think I may say in conclusion, that if this process be not already employed for the industrial production of white gutta-percha, there is no reason why it should not be. The solvent is cheap and the manipulation simple, and if the greater part of the sulphide of carbon were removed by distillation, the cost would be reduced to a minimum.

ON UNITATION,

AS A MEANS OF CHECKING CHEMICAL AND OTHER CALCULATIONS.

By W. H. Walenn, F.C.S.

Of those amongst us who are middle-aged men, some will look back with considerable awe to the time when they delivered up to the stern schoolmaster of former times their multiplication and division sums; at such times, the dread arbiter of our play-hours used to employ an enigmatical, and, to us, a mysterious X, in the angles of which certain figures were placed, and if the upper and lower figures were the same we well know that our work was looked upon as correct, but if otherwise, our lost play-hour, or correctional pat on the hand, carried the fact forcibly to our minds and feelings. Most of us will now know that the then mysterious X referred to "casting out the nines," by which means the multiplication or division was said to be "proved."

It is from this "casting out the nines" (or obtaining the remainder from the division of a given number by nine) as a starting point, that the whole question of "proving," or preferably "checking," calculations will be approached. In "Walkingame's Tutor" the following appears under the head of Multiplication:—"Proof. The usual way of proving multiplication is by casting out the nines from the multiplicand and multiplier; the remainders put on each side of a cross; and multiply the figures on each side together, cast out the nines from the product, and put the overplus at the top: then cast out the nines from the product of the multiplication, and its remainder place at the bottom; if it agree with the top, the work is supposed right."[*] The empirical character of this statement, and its apparent inflexibility, seem most unpromising to yield anything approaching to a method applicable to all kinds of calculations; but some light has been let into the subject, and, after sundry intermittent periods of darkness, it has emerged therefrom in a shape to be of practical use.

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* *Chemical News*, vol. i., p. 33.

† *Chemical News*, vol. vi., p. 259.

‡ "Watts's Dictionary," vol. ii., p. 961, and "Muspratt's Chemistry," vol. ii., p. 351.

The Arabians (about A.D. 800) were most probably aware of the method of checking multiplication and division by casting out the nines; they called it *tarazu*, or the *balance*. At this time the plan was unknown to the Hindoos. About the 13th century, Leonard of Pisa (Leonardo Bonacci) wrote on the application of the method to proving the accuracy of multiplication, and of certain other arithmetical operations. The excellent old monk Pacioli, or Fra. Lucas de Borgo Sancti Sepulchri, the author of the first printed treatise on arithmetic, gives the plan in considerable detail, shows how casting out the nines from a given number may be accomplished by simply casting out the nines from the sum of its digits, and how casting out the sevens, by actual division, can be applied to the same purpose as casting out the nines; he further shows the application of these methods to proving the operations of addition, subtraction, multiplication, and division of ordinary or whole numbers. These advances in arithmetical science are but particular cases of a more general principle that mathematicians of recent times have evolved and proved. That principle is—*That all direct* (*and some inverse*) *operations upon the remainders to divisors are respectively analogous to the same operations upon the dividends*; in other words, "In checking any connected set of calculations, the arithmetical operations that are performed by certain given numbers upon certain other given numbers, are to be performed (in the same order) upon the corresponding remainders—to any chosen divisor—of the given numbers; the result will be same as the remainder—to the same divisor—of the result or answer."

It immediately follows from the foregoing observations, that casting out the nines, or the sevens, or any other numbers, is applicable to checking any sequence of ordinary operations that may occur in practice, for the checking can not only be done to a multiplication or division sum, as formerly put forward, but it may be carried through nearly every operation, however intricate, forming a counterpart of the original calculation, or set of calculations, but in one figure or digit, instead of at length, as in the original calculation.

Unitation is a novel process, or mathematical operation, which (amongst other applications) is intended to take the place of "casting out the nines," and which is especially suited to the full development of the above general principles. The author's theorem,[†] upon which it depends, enables the operation of addition only to be substituted for casting out the nines, and comparatively easy processes to be employed when the remainders to other divisors are required. The remainder of the division of a given number by (say) a given digit, or single figure, may, by means of unitation, be obtained without the least trace of the operation of division, and without knowing any multiple (above 9) of that digit. Moreover, the above-mentioned remainder of any unknown number may be calculated from a known number with which it is connected by a known direct operation, or by some inverse operations.

Before proceeding to describe the method of performing the operation of unitation, considering that this article is intended to be of easy reading, and simple and elementary in character, the following definitions are offered for reminder or instruction:—

Unit, one; the least number of the thing under consideration.

Digit, a single figure in any number, independent of its position in that number. In the number 14072, for instance, its five digits are respectively 1, 4, 0, 7, 2; the 4, in 14072, signifies 4 thousands, but, as a digit, it is simply 4 units. The ten digits are—1, 2, 3, 4, 5, 6, 7, 8, 9, 0.

Dividend, in a division sum, the number to be divided.

Divisor, in a division sum, the number which expresses the parts into which the dividend is to be divided.

Quotient, in a division sum, the number which shows how often the divisor is contained in the dividend.

Remainder, in a division sum, the number (necessarily less than the divisor) which is over, or remains, after the division has been performed and the quotient obtained. For instance, 158721 divided by 235 gives 675 times and 96 over; that is, in this division sum, 158721 is the dividend, 235 the divisor, 675 the quotient, and 96 the remainder. In speaking of remainders, it is shorter to say "the remainder to 9" (for instance) than "the remainder from the division of a given number by 9;" the former phrase will therefore be adopted.

Integer, a number expressive of a whole thing as distinguished from a fraction, or part, of the same thing. Thus the integer 23, in pounds, represents a whole number of pounds; but $\frac{7}{16}$, in pounds, represents the weight which is obtained by dividing 1 lb. into sixteen equal parts, and taking seven of those parts—that is, it represents seven ounces avoirdupois.

A direct operation, in arithmetic, is one which, performed upon an integer (or integers), increases its value and makes the result greater than the integer or integers operated upon. Thus in the addition of 517 to 712, addition being a direct operation, the result, 1229, is greater than either 517 or 712.

An inverse operation, in arithmetic, is one which, performed upon an integer by an integer, gives a result less than the integer operated upon. Every inverse operation undoes the effect of a corresponding direct operation. Thus, in the subtraction of 517 from 1229, subtraction being an inverse operation, the result, 712, is less than 1229 (the integer operated upon), and it perfectly neutralises the effect of the corresponding addition in respect to the number 1229, reducing it to 712 by the subtraction of the operating number 517.

The simplest method of performing "unitation" upon a given number is that which corresponds to dividing that number by 9, and obtaining thereby "the remainder to 9." That remainder is here called the "unitate," it being obtained by "unitating" the number, and when the operation is performed, the number is said to be "unitated." Ordinarily, unitates are single digits, or one-figure numbers; this consideration led to the adoption of the term "unitate." The divisor (say 9) is called the "base" of the unitation. *Unitation to the base 9 is performed upon a given integer or finite decimal by adding its digits together, adding the digits of the result together, and repeating this operation until only one digit (necessarily one or more units) is obtained.* This may be called the "radical" form of the rule for unitating to the base 9, for it is directly derived from theory. In practice, it is never necessary, even in a large number (such as 2905873690, taken at random) to add all the digits together or to repeat the operation, for 9 may be entirely neglected; also, any digits, the sum of which makes 9, that may be found in the number to be unitated, may be cancelled; further, if during the process, any number higher than 9 arises, its unitate should at once be substituted, and the process carried on therewith to the termination of the figures composing the number. It is preferable to commence at the left hand, and to go on towards the right hand until the units place, or the extreme right-hand figure, is reached. Bearing these points in mind, the process for unitating the above-mentioned ten-figure number (2905873690) is as follows :—First, striking out all the nines, 2905873690 becomes ..058....0, for, besides the two nines, the 2 and 7 make 9, and the 3 and 6 make 9; thus, only the digits 5 and 8 are left to be added together; the sum of these two digits is 13, which gives 4 as the unitate of 2905873690. In like manner 15427648836 becomes .5...6.88.., leaving only 5, 6, 8, 8 to be added for the obtainment of the unitate. In adding this, the words repeated would be—5 and 6 are 11 (1 and 1 are 2), 2 and 8 are 10 (1 and 0 is 1), 1 and 8 are 9; this gives 9 as the unitate of 15427648836. Again, in 3250835 no cancelling can take place, and the necessary addition is—3 and 2 are 5 and 5 are 10 (1 and 0 is 1) 1 and 8 are 9 (this is neglected altogether), 3 and 5 are 8; the unitate of 3250835 is therefore 8. The author is indebted to Mr. W. J. Knight, of the Civil, Military, Naval, and Collegiate School, Cork, for the plan of "cancelling" before commencing the additive process of unitation. It may here be noticed—1st. That, by practice, the details of these operations become intuitive, and do not need all the repetition of words here indicated; for the sake of clearness the process is given at length. 2nd. That a distinctive feature which marks the difference between "casting out the nines" and "unitation" to the base 9 is, that, in the former, 9 never appears, but, instead of it, 0; in the latter, 0 never appears, but, instead of it, 9; so that the whole of the nine significant and valuable digits enter into unitation to the base 9. 3rd. Numbers, that are finite decimals, or that partly consist of finite decimals, may be unitated as if no decimal point were present; or rather, as if the decimal point were at the extreme right-hand end of the figures that compose the number. For instance, the unitate of 23·75 is the same as the unitate of 2375, or 8. The unitate of 51·34 is 4. The unitate of ·00731 is 2.

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[*] Division is checked by this process, by casting out the nines as if for the corresponding inverse operation of multiplication, taking care to add to the number obtained from the product of the remainders of the quotient and divisor the remainder of the division in question, and, finally, casting out the nines from the sum thus obtained; the latter remainder should be the same as that obtained by casting out the nines from the dividend.

[†] See Phil. Mag., Nov., 1868.

From what has been already stated, the application of unitation to checking the four first rules of arithmetic becomes almost self-evident; nevertheless, a novel subject demands, for its perfect development, and for its due appreciation, the presentation of that subject from various points of view. In the following examples the law must be constantly borne in mind:—*That whatever arithmetical operations are performed upon and by the ordinary numbers must be performed upon and by their unitates; the resulting unitate will then be the unitate of the ordinary numerical result or answer, if the sum has been worked correctly.*

ADDITION.

I.		II.		III.		IV.	
Nos.	Uni.	Nos.	Uni.	Nos.	Uni.	Nos.	Uni.
7,524	9	..	..	..	..	2,016	9
3,750	6	..	..	..	..	4,212	9
9,147	3	..	..	675,231	6	1,656	9
3,215	2	1,805	5	84,120	6	3,852	9
4,725	9	36	9	3,041	8	1,296	9
2,147	5	19,727	8	16,235	8	3,492	9
3,254	5	3	3	169	7	936	9
2,716	7	1,474	7	2	2	3,132	9
1,047	3	2,008	1	53	8	576	9
						2,772	9
37,525	4	25,053	6	778,851	9	216	9
						24,156	9

In Example I., the single digits or unitates under the column headed "Uni," are obtained to the numbers under the column marked "Numbers" (each unitate being in a line with its respective number), in the same manner as that set forth in the paragraph that treats of the method of unitating; for instance, 9 is placed as the unitate of the top number (7524), because the 7 and 2 may be cancelled, and the 5 and 4 are left to make the required unitate. The addition of the unitates that is necessary to ascertain the unitate of the answer may be performed as in ordinary arithmetic, and the result unitated, or the addition may be made as if the figures formed the consecutive digits of an ordinary number; in the former case the sum amounts to 49, the unitate of which is 4; according to the latter and more convenient method, the only unitates to be added are 3, 5, and 5 (the rest being cancelled), giving 13, the unitate of which is 4. It is found, also, that the unitate of 37525 (the answer or sum) is 4. This example is taken from Walkingame's "Tutor."

Example II. illustrates more perfectly the kind of addition that occurs in practice. The numbers to be added to obtain the unitate of the sum are 5, 3, and 7, the rest being cancelled. This example is taken from De Morgan's "Arithmetic."

In Example III., only 7 and 2 being cancelled, the rest are to be added, as follows :—6 and 6 are 12 (1 and 2 are 3), 3 and 8 are 11 (1 and 1 are 2), 2 and 8 are 10 (1 and 0 is 1), 1 and 8 are 9; 9 is therefore the unitate of the answer, and it is also found to be the unitate of 778851, which is the ordinary numerical result.

Example IV. is from the magic square in De Morgan's "Arithmetic;" it illustrates a property of this peculiar kind of magic square, also a singular case of unitation.

Other examples of addition may be given as follows :—

V.		VI.		VII.		VIII.		IX.		X.	
Nos.	Un.	Nos.	Un.	Nos.	Un.	Nos.	Un.	Nos.	Un.	Nos.	Un.
1111111	7	5555555	8	10001	2	530530	7	9·543	3	1·001	2
2222222	5	6666666	6	10002	3	611611	7	216·75	3	·2357	8
3333333	3	7777777	4	10003	4	710710	7	53·25	6	25·003	1
4444444	1	8888888	2	10004	5	800800	7	1572·141	3	·0024	6
1111110	7	28888886	2	40010	5	2653651	1	1851·684	6	26·2421	8

Examples IX. and X. show the application of unitation to addition of decimals.

SUBTRACTION.

XI.		XII.		XIII.		XIV.		XV.		XVI.	
Nos.	Un.	Nos.	Un.	Nos.	Un.	Nos.	Un.	Nos.	Un.	Nos.	Un.
530	8	10003	4	1000000	1or10	673673	5or14	538·2741	3or12	8723·461	4or13
421	7	560	2	123456	3	5426	8	67 2539	5	1760·09	5
109	1	9443	2	876544	7	668247	6	471·0202	7	6963 371	8

Subtraction is an inverse operation. In Examples XI. and XII., the unitate of the subtrahend (or number to be subtracted) is less than that of the minuend (or number to be diminished by subtraction of the subtrahend therefrom), therefore the operation of subtraction of the former unitate from the latter is performed in the usual manner; in Example XI., 7 subtracted from 8 leaves 1, this is the unitate of 109. In Examples XIII., XIV., XV., and XVI. the unitate of the subtrahend is greater than that of the minuend; in this case it is necessary to substitute for the unitate of the minuend the next higher number that has the same unitate. This is done by adding 9 to the unitate of the minuend; the operation can then be accomplished in the usual way; in Example XIII., 3 subtracted from 10 leaves 7, this is the unitate of 876544. Examples XV. and XVI. show the application of unitation to the subtraction of decimals.

MULTIPLICATION.

XVII.		XVIII.		XIX.	
Numbers.	Uni.	Numbers.	Uni.	Numbers.	Uni.
8	8	365	5	3142	1
4	4	101001	3	3142	1
32	5	36865365	6	9872164	1

XX.		XXI.		XXII.	
Numbers.	Uni.	Numbers.	Uni.	Numbers.	Uni.
17·036	8	15·625	1	222·1	7
4·27	4	64	1	12·34	1
72·74372	5	1000·000	1	2740·714	7

Multiplication is a direct operation; checking it by unitation therefore presents no difficulties. In Example XVII, 8 multiplied by 4 gives 32 as a result or product; 5 is the unitate of 32. In Example XVIII, 5 multiplied by 3 gives 15, the unitate of which is 6; 6 is also the unitate of 36865365; and so on in the following Examples. Examples XX, XXI, and XXII. show the application of the principle to checking multiplication of decimals. It is not thought necessary to give the detailed work of each multiplication.

DIVISION.

XXIII.		XXIV.	
Numbers.	Unitates.	Numbers.	Unitates.
4)132976 33244 and no remainder.	4 divisor. 7 quotient. 1 dividend.	1342)36326599 27069 and 1 remainder.	1 divisor. 6 quotient. 6 product. 1 remainder. 7 dividend.

XXV.		XXVI.	
Numbers.	Unitates.	Numbers.	Unitates.
251)577556 2301 and 5 remainder.	8 divisor. 6 quotient. 3 product. 5 remainder. 8 dividend.	4039)2240·91 ·52 and 23 remainder.	7 divisor. 7 quotient. 4 product. 5 remainder. 9 dividend.

XXVII.		XXVIII.	
Numbers.	Unitates.	Numbers.	Unitates.
·855)7·36100 8·60935 and 575 remainder.	9 divisor. 4 quotient. 9 product. 8 remainder. 8 dividend.	·855)7·361 8·609 and 305 remainder.	9 divisor. 5 quotient. 9 product. 8 remainder. 8 dividend.

Division is an inverse operation. One method of checking it by unitation is to look upon each division sum as an inverted multiplication. If there is no remainder, in a division, the product arising from the multiplication of the divisor by the quotient should be equal to the dividend, supposing that the division be performed correctly; any remainder that there may be should be added to this product to enable the value of the dividend to be attained.

This principle has been acted upon in the above examples, the unitates of the divisor, quotient, remainder (if any), and dividend being used, instead of going through the laborious process of performing the multiplication of the quantities themselves. This will be plain upon mere examination of the Examples given above. It is deemed unnecessary to set forth the details of each operation; the process is merely indicated in the ordinary manner, giving sufficient data for applying the check by unitation. The last three examples involve decimal quantities, XXVIII. being the same as XXVII., excepting that it is not carried so far. It is a prominent feature, which especially applies to the unitation of the results of division of decimals, that the remainders to the divisions must be fully taken into account. There is a very convenient *direct* method of checking division sums, but this cannot be fully applied until the application of the process to reciprocals and to series of numbers is well understood; it is, however, touched upon in the next rule.

RULE OF THREE.

XXIX.

	Unitates.
278 : 160 : : 572 160 34320 572	5 3rd term. 7 2nd term. 8 product . . . . *a.*
$278)91520(329\frac{58}{278}$. 834 812 556 2560 2502 58	8 1st term or divisor. 5 quotient. 4 product. 4 remainder. 8 dividend . . . . *b.*

Numbers.	278 : 160 : : 572 : $329\frac{58}{278}$.
Unitates.	8 : 7 : : 5 : 1. . . . . . . *c.* 7 8)8(1 8 0
	$5 + \frac{4}{8} = \frac{44}{8} = \frac{8}{8} = 1$ . . . *d.*

XXX.

	Unitates.
223 : 267 : : 112 267 784 672 224	4 3rd term. 6 2nd term. 6 product . . . . *a.*
$223)29904(134\frac{22}{223}$ 223 760 669 914 892 22	7 1st term or divisor. 8 quotient 2 product 4 remainder 6 dividend . . . . *b.*

Numbers.	223 : 267 : : 112 : $134\frac{22}{223}$.
Unitates.	7 : 6 : : 4 : $\frac{6}{7}$ . . . . *c.* 6 7)6
	$8 + \frac{4}{7} = \frac{2+4}{7} = \frac{6}{7}$ . . . . . . *d.*

XXXI.

	Unitates.
249·5 : 79·5 : : 56 79·5 280 504 392	2 3rd term. 3 2nd term. 6 product . . . . *a.*
$249{\cdot}5)4452{\cdot}0(17\frac{2105}{2495}$ 2495 19570 17465 2105	2 1st term or divisor. 8 quotient. 7 product. 8 remainder. 6 dividend . . . . *b.*

Numbers.	$249{\cdot}5 \; : \; 79{\cdot}5 \; :: \; 56 \; ; \; 17\frac{2105}{2495}$
Unitates.	$2 \; : \; 3 \; :: \; \begin{array}{r} 2 \\ 3 \\ \hline 2\,)\,6 \\ \hline 3 \end{array} \; : \; 3 \; \ldots\ldots \; c.$
	$8+\frac{8}{2}=\frac{7+8}{2}=\frac{6}{2}=3 \; \ldots\ldots \; d.$

The Rule of Three (in the ordinary arithmetical sense of the term) regarded as an operation, or set of operations, is compounded of multiplication and division. From theoretical considerations, the rule of working is to multiply the 3rd term by the 2nd, and divide the product by the 1st term; the quotient is the answer in the same denomination as that of the 3rd term. The most evident method of adapting unitation to checking the results of the compound operations is to check the multiplication first, as above set forth, and the division afterwards. The upper portions of Examples XXIX., XXX., and XXXI., are checked by this means, *a* being the unitate of the product, and *b* the unitate of the dividend, obtained from the unitates of the divisor, quotient and remainder, as set forth under the head of division; if *a* is not the same value as *b*, the answer is incorrect. Below the upper portions, a *direct* method of checking the rule of three is shown, that is to say, the unitate of the 4th term is obtained by operating with the unitates of the three other terms, according to the rule of three, adhering strictly to the analogy between operations with ordinary numbers and those with unitates. The result marked *c* (in each example) is so obtained. The result marked *d* is simply obtained by unitating the 4th term or answer to the sum, and reducing it by the ordinary rules of fractional arithmetic; if *c* is not the same value as *d*, the answer is incorrect. Two important points have here to be noticed:—1. That, in the case of unitates, the signs : :: :, +, and =, have not the same signification as in ordinary arithmetic; the words "the unitate of" are understood to be placed before every numerical value set down. 2. The "unitates" of the fourth term (whether obtained by the rule of three or by fractional reduction from the numerical answer) should be preserved in their fractional form in all cases in which the division is not possible without a remainder. It may be said that these fractional "unitates" no longer fulfil their name, but they answer their purpose, and enable the uses of this novel operation to be greatly extended.

The three examples given in the application of unitation to checking arithmetical operations in the rule of three give the answers to certain chemical questions. Example XXIX. gives the answer to the question: "From 572 lbs. of ferrous sulphate ($FeSO_4 + 7H_2O$), how much ferric oxide (Fe_2O_3) can be obtained?" The answer is 329 $\frac{58}{278}$ lbs. Example XXX. shows the method of working out the answer to the question: "How much carbonate of lead ($PbCO_3$) is required to yield 1 cwt. of litharge (PbO)?" The answer is 134 $\frac{22}{223}$ lbs. Example XXXI. answers the question: "How much cupric oxide (CuO) is obtainable from 56 lbs. of cupric sulphate ($CuSo_4 + 5H_2O$)?" Answer, 17 $\frac{2105}{2495}$ lbs.

Unitation is also applicable to checking the correctness of tables of various kinds, such as squares, cubes, etc; the series of values formed by unitates of consecutive numbers, or numbers otherwise related, is well worthy of study, and their properties are eminently practical.

Unitation can also be easily performed to other bases besides those already alluded to, such as 10, 11, 99, 999, etc.; it may then be said to be di-unitation, tri-unitation, etc.

The term "checking" is preferred to "proving," for unitation is not a mathematically-true proof of the correctness of an arithmetical result, in a theoretical point of view. It proves nothing; if, however, the sum does not agree with the result given by unitation it is certainly wrong; nothing short of a repetition of the original mathematical process can ensure *absolute* mathematical correctness, and even that may sometimes fail, but the chances of the sum being wrong whilst unitation shows that it is right are much smaller than can easily be supposed without trial. The author, since the beginning of 1866, has never found it fail; a boy (subject to the usual chances of mistakes) who went through the first four rules, during the space of a year, only once had the result of his labours falsely dealt with by unitation.

"Casting out the nines" is one of a series of useful operations; in the shape of unitation it is likely to have extensions that were not possible in its primitive form.

Pharmaceutical Society of Great Britain.

EVENING MEETING,

*Wednesday, April 7th.**

MR. SANDFORD, President, in the Chair.

THE minutes of the preceding meeting having been read and confirmed, and donations to the library and museum acknowledged,

Mr. HOWARD proceeded to make some remarks respecting the

CULTIVATION OF CINCHONA IN INDIA.

He called attention to the embarrassing numbers of varieties and species under cultivation, to the great variation in the productiveness of different kinds, and to the consequent necessity of discriminating between such, and selecting the most productive. The general result of cultivation was to improve the plans subjected to the process, and the cinchona formed no exception to this rule, although it appeared that the amount of cinchonine increased in a greater proportion than that of the quinine.

PATENT MEDICINES.

A MEMBER stated his intention of proposing at the next meeting the total abolition of patent medicines, and expressed his anxiety that all who were able to give information, or wished to advance opinions on the subject, should attend.

The CHAIRMAN said that the matter was under consideration in several Government quarters, and it was even proposed to double the stamp duties.

Mr. MACKAY remarked on the incongruous condition of the patent medicine duties, and moved the universal equalization of such duties, promising the cordial support of those interested in the matter in Edinburgh.

The CHAIRMAN said that, in a communication to Somerset House, he had proposed the equalization of the license duties, by levying a general one of 10s.

Mr. HASELDEN also expressed his anxiety to see the license and stamp duties increased, and drew a vivid picture of the deplorable result of low duties.

WEIGHTS AND MEASURES.

Dr. REDWOOD then proceeded to read a paper, in which he proposed that a discussion should be raised as to the expediency of changing our present system of weights and measures for the metric system. With regard to the abstract proposition, the object approved itself so forcibly that there could be no demur as to its acceptance; objections, therefore, resolved themselves into a question of the balance of advantages attending the adoption of the metric system and the inconveniences of the change. Men capable of judging universally decided in favour of the metric system, and with the general public it was only a question of familiarity. The public generally proposed to patch the old system, rather than adopt a new one in its entirety. The question then arose, should we patch our system or adopt a new one? The only new system we could adopt was the metric. In deciding to change ours for the metric, we did not express entire dissatisfaction with the former or unqualified approval of the latter. It was sometimes lamented that our measures were not accurately defined on scientific principles, whereas it was said the measures of the metric system were so defined. This was an entirely erroneous assumption, and was only true of our system when the inch was said to be the measure of three barley-corns, and the other measures correspondingly defined. The metre of the metrical system was not selected because it was the most useful measure, but because it was the ten-millionth of the arc of the meridian. In basing our system on the vibrations of a seconds pendulum, we had not sought to get a unit of measurement, but simply to determine the length of the inch, retaining our old measures. The great fault in our system was the incongruity of its parts, whereas the metric being decimal, its parts were perfectly comparable. It had, moreover, been found preferable to base measures on artificial standards carefully kept. The advantages of the metric system were not, therefore, in its natural standard, but because its divisions enabled it to be adopted as an international system. To render its adoption easy, it was necessary to give pharmaceutists a definite notion of the integral parts of the system, not a simple acquaintance with its principles. The author mentioned a variety of ways in which this might be effected, including a plan of connecting the new method with the old, by making new measures on the old system of such value as to form links, binding the old, but preserving the integrity of the new system. Such a plan was adopted by the French previous to an entire adoption of the metric system. The French, moreover, enjoyed an advantage, from the fact that medicines with them—both liquid and solid—were measured by weight. The author stated his opinion that the introduction of the metric system in England would be facilitated by Anglicising the names now in use in France, preserving the same pronunciation, but modifying the spelling so as to suit English notions. He then proceeded to quote from the proposition made by Mr. Graham, who had recommended the entire abolition of Troy weight; any sweeping change, however, could hardly be entertained just now.

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* Reported specially for this journal.

Mr. **Haselden** considered that it was necessary that pharmaceutists should at once make themselves acquainted with the new system. He would not, however, adopt Dr. Redwood's plan of merging the old into the new, but would leave it to young pharmaceutists themselves to find out the relations between the two systems.

Dr. **Attfield** concurred with all that Dr. Redwood had said, and congratulated the pioneers of the metric system on the able assurance afforded by him. He himself regarded the introduction of the metric system a mere question of time. Its great advantages were its international character. He then read an abstract from his able pamphlet on the metric system, published a few years ago, setting forth some of the peculiarities of the metric system, and concluded with some remarks referring to the introduction of the system in Germany, and the prospects of its speedy introduction into England.

It was then proposed and carried, that the discussion should be adjourned, and the Chairman announced that an extraordinary meeting would be held on Wednesday, May 5th.

A

BILL

TO

AMEND "THE PHARMACY ACT, 1868."

A.D. 1869.

WHEREAS it is expedient to exempt from the provisions of the Pharmacy Act, 1868, all duly qualified medical practitioners and veterinary surgeons in Scotland:

Be it enacted by the Queen's most excellent Majesty, by and with the advice of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

1. Nothing contained in the first fifteen sections of the recited Act shall extend to or interfere with the business of any legally qualified medical practitioner in Scotland duly registered under "The Medical Act," or of any legally qualified veterinary surgeon in Scotland.

Reserving rights of certain persons.

Abstracts of Foreign Papers.

COMPARISON BETWEEN THE IPECACUANHAS OF BRAZIL AND NEW GRENADA.

IN the *Journal de Pharmacie et de Chimie*, M. J. **Lefort** gives the details of a comparative examination of the ipecacuanha from Brazil and that from the borders of the River Magdalena. The conclusions he arrives at may be enumerated as follows:—That the estimation of the emetine by means of tannin shows that the ipecacuanha from New Grenada contains somewhat less alkaloid than that from Brazil; that an estimation of the emetine in both varieties, by a process which takes advantage of the insolubility of the nitrate of this alkaloid, points out similar relative proportions; that the odour and irritating property peculiar to ipecacuanha is less strongly developed in that from New Grenada than in that from Brazil; that the root from New Grenada derives no advantage in virtue of its superior size over that from Brazil, inasmuch as the greater thickness of its cortical part is accompanied by a corresponding increase in the amount of the meditullium.

Although the ipecacuanha from New Grenada possesses a composition and properties very closely resembling those of the Brazilian root, the author does not consider that the one should be replaced by the other in pharmacy. Notwithstanding, he is of opinion that in the event of a decrease in the supply from Brazil, medicine would find a very precious substitute in the ipecacuanha from New Grenada.

PREPARATION OF PODOPHYLLIN.

The *Journal de Pharmacie d'Anvers* gives the following recipe for the preparation of podophyllin:—Boil the root of *podophyllum peltatum* with lime, and precipitate the lime from the filtered decoction with double sulphate of iron and zinc; evaporate the filtrate to a syrupy consistence, treat the latter with alcohol, and filter again; evaporate the alcoholic solution, and re-dissolve in boiling water. On cooling, a deposit of podophyllin is obtained.

THE ADULTERATION OF OLIVE OIL.

The President of the *Comité du Commerce des Alpes-Mara-*

times publishes a letter, in which he offers, on behalf of that body, a prize of 15,000 francs to the inventor of a rapid and easy method, not involving strict chemical manipulation, for detecting the admixture of seed oils with olive oil.

SALTS OF STRYCHNINE SEPARATED BY MEANS OF PHENIC ACID.

M. PAUL BERT submits a property of phenic acid to the attention of chemists, under the impression that it may have some industrial value, or be useful in medico-legal practice. He states that if a dilute solution of hydrochlorate of strychnine be shaken with a few drops of phenic acid, and the emulsion obtained be carefully filtered, the filtrate will be found to be divested of its poisonous properties, the whole of the strychnine being contained in the portion remaining in the filter. M. Bert has assured himself that strychnine may be thus removed with equal facility from putrefied animal matters. If the emulsion obtained by the agitation of phenic acid with the dilute solution of strychnine be treated with ether, the former is removed, whilst the limpid solution is found to contain the whole of the strychnine. M. Bert has not extended his experiments to many alkaloids, but leaves the determination of the value of the process to other chemists.

NEW PROCESS FOR THE PREPARATION OF PHOSPHORUS.

M. AUBERTIN communicates to the *Moniteur Scientifique* a process for the preparation of phosphorus, based on the fact that silica in presence of carbon displaces and reduces phosphoric acid combined with earthy bases, silicates of these bodies being formed. The author submits to the action of a strong furnace silica and fossil phosphate of lime in such proportions that the silica shall preponderate over the lime, but yet not be in such excess that an infusible silicate be formed. To augment the fusibility of the silicate produced, a little alumina and magnesia may be added, if enough is not present, inasmuch as the silicates with several bases are more fusible than others; to effect this, clay is of great service. The escaping gases mixed with vapours of phosphorus may be condensed by any suitable contrivance, or be burned, and the immediate production of phosphoric acid be effected.

Veterinary Notes.

BY W. HUNTING, M.R.C.V.S.

PHYSIC MASS.

THE best purgative for a horse is undoubtedly aloes, and of its varieties I prefer the Barbadoes. Cape aloes is also good, but requires one drachm more per dose. No other variety, I think, can be depended upon. In an emergency aloes in powder can be readily made into a ball with some confection, or with linseed meal and treacle; for convenience, however, it is usually made into a soft mass of known composition, from which a portion can be made into a ball when required.

A very simple and good formula I copy from Professor Gamgee's "Veterinarian's Vade Mecum:"—

Aloes, 8 parts } Melt aloes and treacle
Rectified Spirit, 1 part } in a water-bath and
Treacle, 3 parts } then add the spirit.

The dose of aloes for an ordinary carriage horse is about ʒv., and for a heavy cart-horse ʒvi. For every drachm of aloes take one and a-half of the above mass.

Some veterinarians combine ginger with their aloetic masses, but this addition is of little importance. The addition of gentian increases the action of aloes as does a previous course of iron.

A very clean and efficacious mass is made by adding carbonate of potash. Care, however, must be taken to stir the ingredients frequently when melting, as a certain amount of effervescence takes place and a quantity may be lost.

Aloes	16 oz.
Linseed Oil	3 ,,
Potas. Carb.	2 ,,
Aqua	5 ,,

Melt together in a water-bath. Calculate the dose as required. Aloes forms two-thirds of the mass.

SPRAIN.

Sprain, by which I mean a stretching or even partial rupture of a ligament or tendon, varies in degree according to its severity and situation. Sprain of a joint ligament may induce organic disease in the joint itself; sprain of a tendon may be followed by permanent thickening and defective action. No matter how slight a sprain may appear, it should be carefully treated. The most common error in the treatment of sprain is confusing the acute with the chronic stage, applying cold to a chronic injury and stimulants to a recent one. The indications of treatment are in the first stages to keep down inflammation and prevent exudation and swelling; in the second to stimulate absorption, promote repair, and guard against complications.

In the first stage then we wish to keep down inflammation. With this intent we apply either hot or cold water: whichever we use must be kept up continuously, so as not to produce a reaction. Cold water is preferable if the injury be quite recent—not if much swelling and congestion exist. With the water some medicament is expedient. If cold is used either tincture of arnica or spirits of wine may be added, for I believe one to be as useful as the other, or what I believe to be best of all

Potas. Nit. }
Ammon. Chlor. } Equal parts.
Sodium Chlor. }

Water Q.S. to dissolve the above.

If warm water is used, some anodyne may be added as belladonna or opium.

This treatment must be continued until all violent symptoms have passed off—till the intense pain and heat are gone; then we may substitute a dry bandage and occasional mild hand-rubbing for a day or two, after which some stimulant is needed to promote absorption and repair. In ordinary cases I do not advise a blister; it is too active and its effect is of too short duration. It is better to adopt some milder treatment and continue it longer. There are many good applications. Liniments of ammonia or iodine, and tincture of cantharides are all good. They should be applied daily in small quantities and with moderate friction.

A very good stimulating liniment may be made as follows:—

Castor Oil }
Rape Oil } 2 oz. of each.
Turpentine }

Shake and then add

Liq. Ammon. Fort. } 3 oz. each.
Water }

This preparation has the merit, too, of being elgant, and can be diluted with water in proportion to its own bulk, without losing in appearance. Should this treatment not effect a cure, the part must be blistered once or twice, and as a last resort, firing and a run at grass may be necessary. Rest in all cases is absolutely essential, and that too for a considerable time. Cases seemingly incurable will frequently come up sound after a summer's run. Whilst confined to the stable an animal should not be allowed much corn; bran should be used with grass or hay, and the bowels should be kept open with physic if necessary.

THRUSH.

Every horseman knows this disease of the horses' foot by sight, many know how to cure it, but few know the cause, and thus its prevention is neglected. Doubtless dirt is the exciting cause, but dirt alone, I believe, seldom produces a bad "thrush." Heavy cart horses are of all most subjected to dirty roads and their feet are most neglected in the stable. Nevertheless, with few exceptions they are free from this evil. The horses of gentlemen and dealers are not as a rule subjected to much dirt; they have the greatest attention in the stable, and yet they are of all classes most troubled with thrushes. I know of but one operation which can account for the difference. Cart-horses are neglected by the horse-shoer, whilst the feet of the lighter horses are trimmed and pared so as to please the eye. In a state of nature the horses' frog comes down on the ground at each step. When shod, and especially if much pared, it seldom or ever gets the slightest pressure. Now this pressure I hold to be necessary to the healthy growth of the frog. Just as a man's hands become hard and strong by work, or weak and tender by idleness, so the horse's frog, by being never brought into use, gets thinner and weaker, and thus is not able to bear up against such an amount of dirt and wet as would have no effect upon a sound strong foot. Want of pressure then, we say, is the *predisposing*, and dirt the *exciting cause*. It will generally be found that horses standing in a stall have the hind feet affected more frequently than the fore; the reason of course is that the hind are most exposed to the excreta of the animal.

The treatment is very simple—First thoroughly cleanse the foot with warm water and remove all loose portions of horn; then apply some mild astringent, and stimulant. The discharge should not be dried up suddenly by any strong dressing, as a swollen leg is a not uncommon sequel. The following is good:—

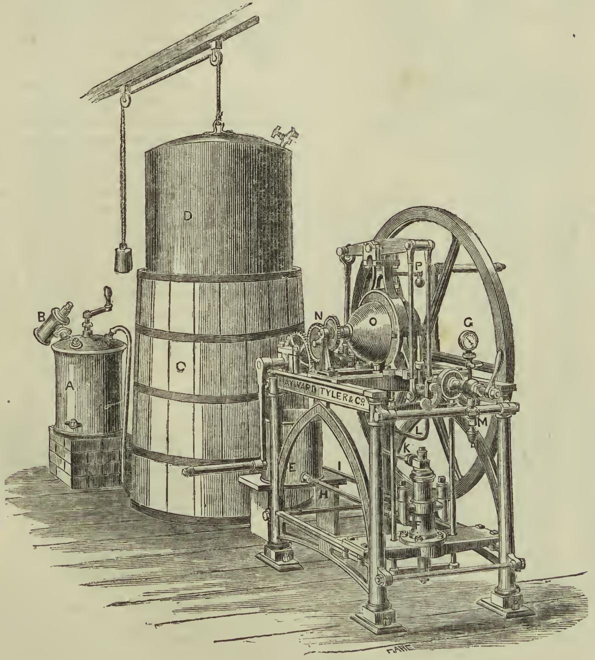
Alum...	1 part
Common Salt	1 ,,
Stockholm Tar	4 ,,

Should the case prove obstinate, substitute for the salt sulphate of zinc. Should you prefer never to have a thrush in your stable, give orders that the frogs are not to be pared at the forge, but that merely the *loose* portions of horn are to be removed.

MACHINERY EMPLOYED IN THE PREPARATION OF AËRATED WATERS.

BY MR. JOHN BRIGGS.*

THE Single Beam-Action Machine patented by the late Hayward Tyler has already been described (see page 189), but as it is exclusively demanded in some foreign markets, and used by many of the best manufacturers in England, its construction is now fully elucidated by the aid of an engraving. A is the gas generator; B, the acid bottle; C is the water-tub into which the gasholder, D, descends; D is the solution-pan connected with the pump, F, by the copper pipe, H; I is the pipe which conveys the gas from



PATENT SINGLE BEAM-ACTION MACHINE.

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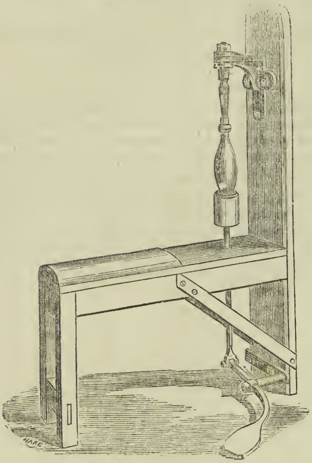
* For the commencement of this Article see March number, page 186.

the holder to the pump; K is the pipe for conveying the mixed gas and water from the outlet valve of the pump to the condenser, O; P is the safety-valve of the condenser; N is a train of wheels for communicating motion to the agitator within the globe; L is the discharge pipe; M, the bottling tap; and G, the pressure gauge.

THE WIRING MACHINE.

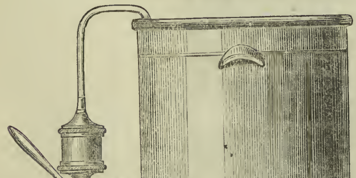
This is a simple machine used in wiring down the corks directly they leave the hands of the bottler, or after they have been tied down with string. It consists of a strong cast-iron bracket fixed on a thick board connected with a stool for the man or boy to sit upon. The bottom of the bottle is placed in a hollow cut in a wood block, which is fixed on the end of a vertical iron rod connected with a treadle. By pressing the treadle with the foot the bottle is raised, so that the cork comes in contact with the flattened end of an iron rod proceeding from the iron bracket. Pressure is now applied by the foot, and while the bottle is in this position the wire is passed over the cork on each side of the wire rod to the loop and secured in the usual way.



WIRING MACHINE.

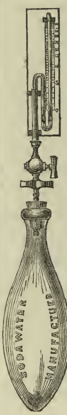
THE SYRUPING TAP.

This is a useful little contrivance for charging the bottles with syrup prior to filling them with aërated water. The tap or cock which fits into the vessel containing the syrup, is provided with a cylindrical measure to hold the exact quantity required for each bottle. When the handle of the cock is turned one way the measure becomes charged with syrup, and when it is turned the other way the outlet of the syrup-vessel is closed and the contents of the measure are discharged into the bottle. A small air-tube is carried from the top of the measure, to enable the syrup to fill it without impediment. By the aid of this tap a boy can syrup thirty-six dozen bottles per hour, and the perfect measure of the syrup can always be depended on.



SYRUP VESSEL, WITH MEASURING TAP.

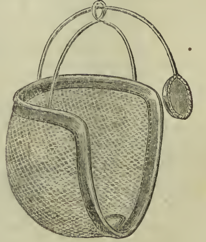
THE TESTING GAUGE.



This is an instrument for ascertaining the pressure of gas in the soda-water bottles after they are corked, in order to check the work of the bottlers, and also to test the soda-water of different makers. It can easily be attached to a soda-water bottle by a small cock provided with a screw for penetrating the cork. The gauge itself consists of a bent-glass tube sealed at one end, containing a certain quantity of mercury, and provided with a small ivory scale graduated to 100lbs. per square inch. The gauge being secured to the bottle cock by a small union joint, when the cock is opened the compressed gas passes out of the bottle into the pressure gauge and forces the mercury up the closed limb compressing the confined air. The height to which the mercury rises thus indicates the pressure. It has been found from repeated trials that the pressure in the bottles of soda-water varies from 40 to 60 lb. per square inch, and seldom rises so high as 70 lb.

HAND OR KNEE BOTTLING.

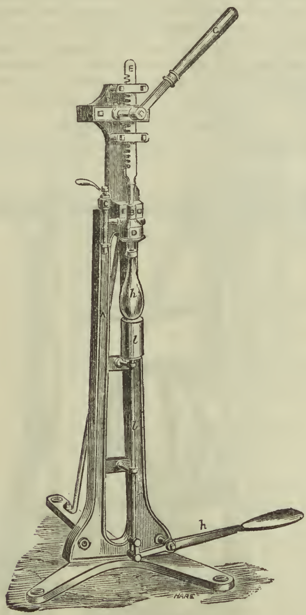
This is the most difficult part of the manufacture. The great dexterity required for inserting the cork into the neck of the bottle with the least possible waste of gas can only be acquired by practice, and I may here observe that, however strongly the water may have been aërated in the machine, the quality of the product may be seriously impaired in the operation of bottling. A good bottler is therefore quite an acquisition to a manufactory. The articles required in bottling are a large leather apron, a knee board, a wooden mallet to drive the corks, and a leather shield or thick glove to hold the bottle and protect the hand in case the bottle should burst while it is being fitted. A wire mask is also often used to protect the eyes and face in case of such an accident happening. The bottler sits on a chair or stool in front of the bottling tap, and the bottles in which corks are already filled, are placed on his right-hand side. He takes up a bottle places it on the knee-board and holding it with his left hand he raises his heel and so presses the mouth of the bottle against the leather nipple of the cock



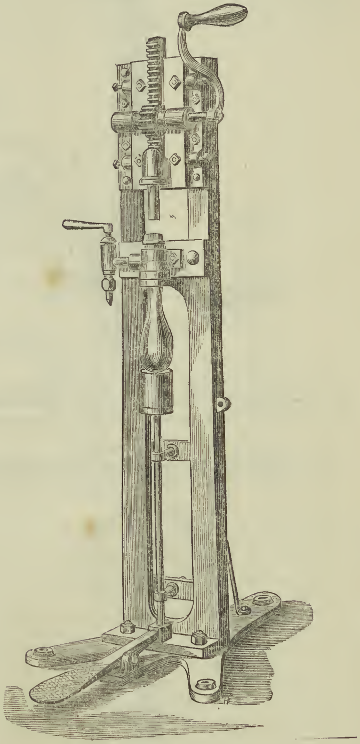
He then opens the discharge valve and having allowed a certain quantity of the aërated water to rush into the bottle, he eases the neck on the nipple once or twice in order to get rid of the confined atmospheric air, and afterwards fills the bottle to the required height. The discharge valve being closed, he holds the bottle firmly with the left hand and having the cork between the finger and thumb of his right hand he places its end on the side of the neck; then suddenly lowering his heel to release the neck from the nipple, he dexterously inserts the cork, drives it in with his mallet and hands the bottle to his attendant who ties the cork down.

MACHINE OR RACK BOTTLING.

The Bottling Machine is made to fill the bottle and drive in the cork before removing it from the mouthpiece, and many years since such a machine was a great desideratum. About forty years ago, when there were comparatively few soda water makers, machine-bottling was not thought of, but on the abolition of the stamp duty a great number of persons of the country commenced the manufacture of soda water, on a scale not sufficiently extensive to afford regular employment to bottlers. These felt the want of some mechanical contrivance by the aid of which the work of the bottler could be performed, and their demands led me to construct such a machine. The first bottling machine I made had its working parts fixed on a thick board, which was intended to be fastened to a wall or post. I afterwards improved this arrangement by employing an iron standard on a base plate, so that the machine could be fixed in any situation. In the construction of this machine it was necessary that means should be provided for getting rid of the confined atmospheric air, as in knee-bottling. The adoption of a treadle enabled me to effect this object. By the action of the treadle the bottle can be pressed upwards into the conical mouthpiece, or eased to permit the escape of air, at the will of the operator. The cork-holder is conical, the diameter of the lower opening being rather smaller than that of the inside of the neck of the bottle, so that the cork is compressed on being forced through the holder into the neck. There is a screw valve on the left-hand side for letting the water into the bottle, and this valve is attached to a pipe communicating with the soda-water machine. The bottle having been placed on the wooden block and pressed up into the mouthpiece, the cork is inserted in the upper part of the conical holder and forced a little way down by the rack which is worked by moving the handle from left to right. The bottle having been filled the cork is driven home. After a few hours' practice any one can bottle with this machine. This machine has since been copied by various other makers, and adopted largely throughout the trade. Illustrations are also given of two other forms of bottling machines. One is simply an alteration to enable it to be made more cheaply, the rack and pinion being made of cast iron; the way of working is exactly similar to the one already described. The other is a machine specially

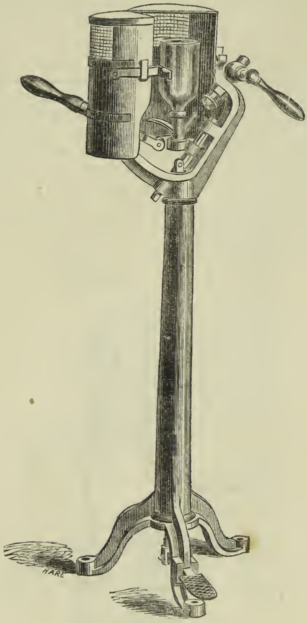


BOTTLING MACHINE.



BOTTLING MACHINE, NO. 2.

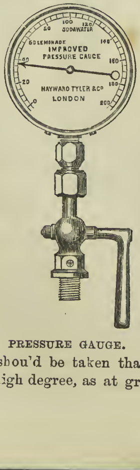
made for filling *syphon bottles.* The syphon being placed upside down, the nozzle of it is forced by the action of the treadle against a nipple connected with the cock to admit the water. A separate lever worked with the left hand presses down the spring handle of the bottle, thus opening it. The bottle while filling is enclosed in a sheet iron case, opening with a hinge, and provided with a wire grating.



SYPHON BOTTLING MACHINE.

THE PRESSURE GAUGE.

The Pressure Gauge or Indicator is on the Bourdon principle. The dial plate is graduated from zero to 200 lbs. per square inch. Care should be taken that the pointer never moves beyond this high degree, as at greater pressures the gauge will become deranged and indicate falsely. The use of this gauge is to enable the bottler to see that a uniform pressure is kept up in the condenser, so that he may be sure of having a nearly uniform product in the bottles. No soda-water machine should be without one. In the absence of an indicator, the bottler has nothing to guide him but the pressure on his knee, or the safety-valve, which is often overloaded, and he cannot possibly avoid the frequent breakage of bottles. A London firm, celebrated for its soda water, found that the application of pressure gauges to their machines was followed by a reduction of the average breakage to one-fourth. We generally fit a stop-cock to the pressure gauge so that it can be shut off from the condenser in case it gets damaged. The instrument can be fixed in any convenient situation and connected with the condenser by a pipe.



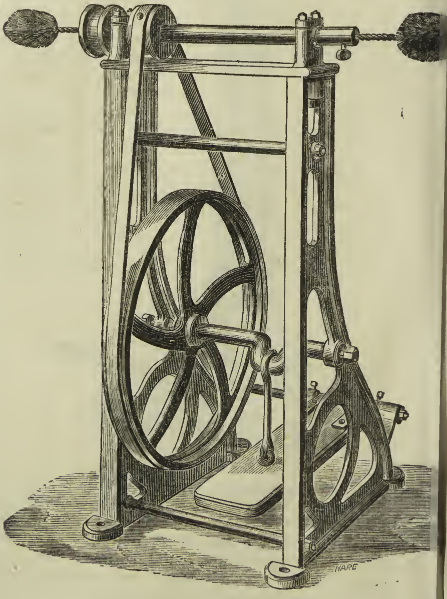
PRESSURE GAUGE.

THE WATER GAUGE.

The Water Gauge is another useful appendage to the soda-water machine. It consists of a vertical glass tube, the ends of which are fixed perfectly tight in brass sockets, the lower one being attached to the bottom of the condenser, and the upper one to the top in such a manner that the water and the gas have free access to the tube. It follows that as the gas and water are pumped into the condenser the water will rise in the glass tube to the same level as the pressure within the condenser, and the tube is the same. The object of the water gauge is to enable the bottler to see the height of the water in the condenser, which should always be about three-fourths full. In large machines the water gauge is almost indispensable.

BOTTLE BRUSHING MACHINE.

This machine is made to facilitate the cleaning and washing out the inside of the bottles instead of using leaden

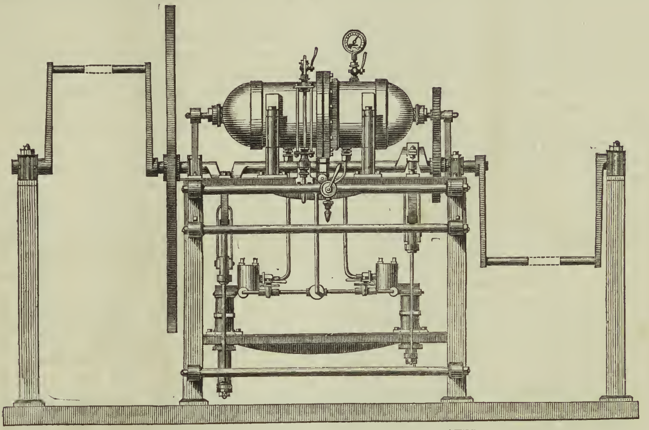


BOTTLE BRUSHING MACHINE.

shots and brushing them out by hand. It consists of a wrought-iron spindle, made to revolve at a rapid rate in suitable bearings, in a cast-iron headstock similar to a lathe. The iron spindle is bored out at the end to receive the wire of a bottle brush which is secured by a set screw. The spindle is constructed to take one or two brushes as occasion may require. The drawing represents one of these machines with a fly wheel and treadle to work by the foot or steam power, and is intended to be placed between two tubs or tanks containing water, so that two persons can be cleaning bottles at the same time. The headstock can be had separate with the spindle for one or two brushes, and it can be fixed on a suitable bracket from the wall or on a plank over the water tank where steam power is always used. The pattern of frame shown is one that I designed some years ago, and which has since been generally adopted, but other shapes can easily be made.

SODA-WATER MACHINE FOR TROPICAL CLIMATES.

This machine was originally made under the direction and supervision of a gentleman who had been many years practically engaged in a soda-water manufactory abroad, where natives only were employed. The natives of tropical countries being generally of small stature and deficient in muscular power, the winch handles at each end of the crank shaft are made long enough to enable several men to work them together. The water is aërated in a strong copper cylinder, well tinned inside, which is made in two parts with uniting gun-metal flanges secured by bolts. The agitator spindle passes through a stuffing-box at each end of the cylinder, an arrangement which effectually prevents the displacement of the agitator; and the ends of the spindle are supported by suitable iron brackets, so as to relieve the stuffing-boxes from pressure. Two pumps on the Bramah principle are fixed in the frame, both of which are connected with the single cylinder, as the natives cannot, or will not, work the machine at a speed sufficient to supply the bottler by means of one pump only. The pumps may, however, be worked separately; and, on the other hand, the condenser may be provided with two bottling cocks. The machine can be readily adapted to steam power, and may then supply two bottlers, and produce 600 dozens per day.



SODA-WATER MACHINE FOR TROPICAL CLIMATES.

THE PURIFICATION OF BISMUTH.

BY E. B. SHUTTLEWORTH.*

As the bismuth of commerce is almost invariably contaminated with other metals, its purification constitutes an essential step in the preparation of any of its compounds for medical use. Nor should this process be partial in its results, at least in regard to those impurities which are of a dangerous character. Several disastrous accidents are said to have arisen from the employment of the crude metal containing arsenic; and this element is very frequently present, to a greater or less extent. Lead is often found in commercial bismuth, and may find its way into the preparations also. With regard to copper, it is not probable that any serious result would ensue from its presence, as the proportion is very small; but it effectually spoils the appearance of liquor bismuthi, even when in minute quantity. A paper read recently before the Pharmaceutical Society of Great Britain, by C. H. Wood, states the amount of copper in different samples of bismuth to vary from 0·04 to 0·1 per cent., thus giving about the 5-1000ths of a grain to the dose of liquor bismuthi prepared from the most impure specimen. This is just sufficient to give a tinge of colour, which, to a customer's mind, may be strongly suggestive of a bad preparation; but, as Dr. Attfield justly observes, "chemists and druggists generally depend too much on the eye and too little on the test tube," or in other words, they strain at the gnat—copper, and swallow the camel—arsenic. After all, however, appearance is something, and more especially when a preparation, which should be colourless, turns out of a bright green or blue. Very recently, I dissolved a quantity of bismuth procured from an English house of good repute, and marked "purificatum," which strongly indicated a larger amount of copper than Mr. Wood's worst sample, as the solution was of a deep and decided emerald green. Moreover, I have remarked that liquor bismuthi, with even a tinge of copper, has a certain metallic and inky taste, which, if only out of consideration for the patient's palate, should be avoided. Silver is often associated with bismuth in nature, and its occurrence in the oxychloride, prepared from the crude metal, has given rise to the statement to be found in many works on chemistry, that the compounds of bismuth darken by exposure to light; this only takes place, however, when they contain silver. The favourite cosmetic—pearl white—is sometimes composed, in part, of this impure oxychloride, and occurrences are not rare where the alabaster brow of a belle has, after an afternoon's promenade, assumed a delightful lavender tint, or, perhaps, a lead grey—a result not at all surprising to the chemist, but certainly calculated to provoke remark amongst the uninitiated. Of course the presence of arsenic in pearl white proves absolutely dangerous to those employing it.

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* From the *Canadian Pharmaceutical Journal*, March, 1869.

In addition to the impurities above mentioned, there are others of less frequent occurrence, existing only in minute quantity, comparatively inoccuous, and therefore of minor importance to the pharmacist, such as gold, iron, sulphur, nickel, cadmium, thallium, etc. In regard to thallium, I may say, that if taken internally, it communicates an exceedingly offensive and disgusting odour to the person, which, if the patient perspire freely, becomes much aggravated. A certain doctor, whose name I forget, in experimenting with this element, found this disagreeable effect to continue for many weeks. Such a consequence might follow from the use of impure bismuth compounds, but is not very probable.

My remarks will be confined principally to the separation of arsenic and copper; but those desirous of obtaining the metal chemically pure can obtain all the necessary information by reference to the article "Bismuth," in Watts's *Dictionary of Chemistry*.

There are two ways employed by chemists for removing arsenic, which may be termed the *dry* and *wet* methods. I am not aware who originated the first, but it has been adopted by the *British Pharmacopœia*, and is recommended by Gmelin, Watts, and many other authorities. The latter mode was proposed by Wittstein, and subsequently brought into notice by Dr. Herepath, and is without doubt the best of the two, as far as practical results are concerned.

The Pharmacopœia process, if well performed, is effectual in removing arsenic, and also in diminishing the amount of copper, but is always attended with considerable loss of bismuth also. In inexperienced hands it is by no means economical, as by raising the heat a little higher than indicated, the metal is rapidly oxidised. As far as my own experience goes, I should advise that the fusion be made in an ordinary iron melting-ladle, instead of the prescribed crucible; and that the quantity of nitre be increased to one-half the weight of the bismuth. By adopting this plan the heat is more perfectly under the control of the operator, as the ladle can be held over an ordinary fire, and instantly withdrawn if too hot. By imparting a gyratory motion, every particle of the metal comes into contact with the nitre which floats on the top. The additional quantity of nitre allows of the fusion being continued a much longer time than when a small portion is employed, but with a smaller loss of bismuth. One fusion will generally be found sufficient. By oft-repeated fusions the copper may be so far diminished as to be inappreciable in a dilute solution, but the process is not to be recommended, as incurring too great waste.

It was formerly thought that by dissolving bismuth in nitric acid, and precipitating the sub-nitrate by the addition of water, that any arsenic that might be present would be found in the supernatant liquid. It has been found that such is not the case, as by the action of the nitric acid the arsenic is converted into arsenic acid, forming with the bismuth an insoluble arseniate, which is precipitated with the sub-nitrate.

The method of Wittstein consists in dissolving the metal in nitric acid, and boiling with a solution of caustic potash, or soda. The bismuth is precipitated first as a hydrated oxide, which loses water by boiling, and is changed thus to anhydrous oxide. In this state it can be used for most pharmaceutical purposes, even with greater convenience than the metal itself.

There is still another method which may be pursued to advantage, namely, purification by crystallization. This plan is particularly applicable to the preparation of liquor bismuthi. By evaporation of the nitric solution to the crystallizing point, crystals of the ternitrate may be obtained of tolerable purity. By repeating the process, the greater part of the impurities—and especially the copper—are left in the mother liquor.

There is only one method of which I am aware for the perfect separation of copper. It consists in forming a solution of nitric acid, and adding liquor ammonia until all the oxide is precipitated. It must be remembered that this oxide is soluble in ammonia, and care must be taken that the precipitant be not in excess. The precipitate must be well washed with water, and may be easily reduced to the metallic state, but for preparing the compounds of bismuth it is preferable to the metal itself. Liquor bismuthi made from this oxide is perfectly colourless, and well repays the trouble expended upon it, being a credit to the manufacturer, and this is, otherwise, seldom the case.

CONSEQUENCES.

In a letter addressed to the editors of the *Pharmaceutical Journal* under this head, Mr. Richard Reynolds, of Leeds, shows how the Pharmaceutical Society's sphere of action may be extended by certain wise reforms which he justly regards as the legitimate consequences of the Pharmacy Act of 1868.

Although we object to reprint the correspondence of our contemporaries, we think that this letter ought to be read by all who are affected by the statute referred to, and we feel bound to extend its circulation. Mr. Reynolds writes:—

"Those who accomplished the feat of shooting the Niagara of pharmacy half a year since, may now consider the consequences of that leap. Firstly, let us realise that we have reached and passed what was for a quarter of a century the goal of our aspirations. We must for the future be attracted by new hopes and aims, and shall find ourselves brought under new influences on all sides. But we have everything to hope and nothing to fear, because the principle of self-government has been so amply vindicated in the final settlement of the "Pharmacy Act, 1868." Had our interests depended upon the caprice of a Government official, or had the election of the Council been subject to unjust limitations, we might have stood aside with a feeling of helpless indifference. But now the Council ought in practice to represent what it does in theory, viz., the sentiments of our body at large. But to bring the actions of the Council into accord with the sentiments of its constituency, it is evident that we must know much more of the opinions and tendencies of individual members of Council than is the case at present, and that the Council, as such, must act in the light instead of in the dark.

"The indiscriminate publication of all that occurred at meetings of the Council would not be proposed by any reasonable man; but the new fact that the Council of the Pharmaceutical Society holds, on behalf of the State, the control of pharmacy in Great Britian, justifies the demand that the deliberations of that body shall be consistent with the spirit of our national institutions. The General Medical Council has had to open its doors to the press, and probably would not recur to the old system, even were it possible.

"It is evident that some evils might be promoted by the injudicious application of the principle of publicity; one of the most apparent being the encouragement of possible demagogues, talking for notoriety. Even this evil would not be a fatal one, and it is by no means certain that such efforts to please the lieges would succeed; but they would prove futile under the system of *regulated publicity* for the acts of members of Council which I advocate. Will some of our representatives favour us with their opinions on the question?

Another consequence of the "Pharmacy Act" appears to me to be this. Many members have wished for local examinations, and only desisted in their advocacy of the principle because of the general question of pending legislation. Now the necessity of the case is much modified; and it is not needful as a question of obtaining members that the Society should increase the facilities for entrance. All *must* present themselves for examination, although it will still be proper to afford every reasonable facility for doing this. But if not disposed to insist on the immediate necessity of local examinations, I feel that there is a want of a most pressing character, viz., the means of local education. That Bloomsbury-square will continue full to overflowing, as at present, and will attract the *élite* of the pharmaceutical students of the kingdom, may be safely assumed.

"But this does not account for more than a tithe of the students who must annually offer themselves for the Minor and Major Examinations; and provincial schools of pharmacy for our leading centres of population are evidently a necessity. Now I wish to claim for such efforts the countenance and support of the Council, conveyed in such a way as may meet the special requirements of the case. It is evident that local interest and support must form the nuclei of any new schools, and I claim that wherever these may develope a complete scheme of efficient pharmaceutical education in the provinces, they shall be subsidized and supplemented by the Society, upon the same principle that induced it to spend money for years upon the school at Bloomsbury-square, and to give a student for £30 an education costing £60 or more. The science-teaching of the country is encouraged by Government upon a principle similar to this, by capitation grants, payments for results, prizes, scholarships, contributions of 50 per cent. towards the cost of apparatus, etc. Let the principle be granted, and the financial question will not be difficult. Our Society had £4,600 of invested property on account of its general fund a year since, and certainly it is no duty of ours to lay up this money for posterity. Such a bold and comprehensive scheme as that set on foot by our brethren at Newcastle-on-Tyne well deserves the support to which I am alluding, even though we may regard it as an experiment. Again I would ask, what say our representatives?"

MICHAEL FARADAY.

BY DR. H. BENCE JONES, F.R.S.*

Æt. 32 (1824.)

FARADAY was elected Fellow of the Royal Society, January 8th. This year he published only a historical statement in the *Quarterly Journal of Science* on the liquefaction of gases, showing that carbonic acid, ammonia, arseniuretted hydrogen, chlorine, sulphurous acid, had been liquefied before his own experiments in 1823. He joined Mr. Brande in the delivery of the morning course of chemical lectures at the Institution. In July, he went to the Isle of Wight with Mrs. Faraday, and returned again in August to bring her home. He was elected an Honorary Member of the Cambrian Society of Swansea, and a Fellow of the Geological Society. This year, the President and Council of the Royal Society appointed a committee for the improvement of glass for optical purposes, consisting of Fellows of the Royal Society and members of the then Board of Longitude.

Æt. 33 (1825).

Faraday was made Director of the Laboratory of the Royal Institution, and therein he had three or four evening meetings of the members of the Institution, from which came the Friday evening meetings of the members. He was elected a Member of the Royal Institution, and a Corresponding Member of the Society of Medical Chemists, Paris. He had a paper on new compounds of carbon and hydrogen, and on certain other products obtained during the decomposition of oil by heat, read to the Royal Society, and printed in the Transactions; one of these substances was benzol. He had a paper in the *Quarterly Journal* on some cases of the formation of ammonia, and on the means of testing the presence of minute portions of nitrogen in certain states.

In May, a sub-committee, consisting of Mr. Herschel, Mr. Dollond, and Mr. Faraday, was appointed to have the direct superintendence and performance of experiments on the manufacture of optical glass. "It was my business to investigate particularly the chemical part of the inquiry. Mr. Dollond was to work and try the glass, and ascertain practically its good or bad qualities; whilst Mr. Herschel was to examine its physical properties, reason respecting their influence and utility, and make his competent mind bear upon every part of the inquiry. In March, 1829, the committee was reduced to two by the retirement of Mr. Herschel, who about that period went to the Continent."

In July, he left London by steamboat for Scotland. After visiting the damask works, he went to Leith to see the glass works. He minutely describes the geology of Salisbury Craig, Arthur's Seat, and Craigleith quarries, and then went to Rubislaw (Bleaching Liquor Works), Aberdeen. Here he made many experiments for the proprietors, with whom he stayed.

Æt. 34 (1826).

He had a paper on the Mutual Action of Sulphuric Acid and Naphthaline printed in the Philosophical Transactions, and another on the existence of a limit to Vaporization, and in the *Quarterly Journal of Science* four papers—on Pure Caoutchouc and the Substances by which it is accompanied in the state of Sap or Juice, on the Fluidity of Sulphur at common temperatures, on a peculiar perspective appearance of aërial light and shade, and on the confinement of Dry Gases over Mercury.

There were seventeen meetings of the members of the Royal Institution held on Friday evenings during this season, and at these Faraday gave seven discourses—on Pure Caoutchouc; on Brunel's Condensed Gas-engine; on Lithography; on the existence of a limit to Vaporization; on Sulphovinic and Sulphonaphthalic Acid; on Drummond's Light; on Brunel's Tunnel at Rotherhithe.

This year he was relieved from the duty of chemical assistant at the lectures given at the Institution, because of his occupation in research, and he was made an honorary member of the Westminster Medical Society.

In his cheminal notes, there is an analysis of "committee glass" and Saxony gunpowder, and remarks on calico printing and soap-making, and soda from common salt.

In July, he again was in the Isle of Wight.

Æt. 35 (1827).

Faraday gave his first course of lectures in the theatre of the Institution in April on Chemical Philosophy.

He writes:—"The President and Council of the Royal Society applied to the President and Managers of the Royal Institution for leave to erect on their premises an experimental room with a furnace, for the purpose of continuing the investigation on the manufacture of optical glass. They were guided in this by the desire which the Royal Institution has always evinced to assist in the advancement of science; and the readiness with which the application was granted showed that no mistaken notion had been formed in this respect. As a member of both bodies, I felt much anxiety that the investigation should be successful. A room and furnaces were built at the Royal Institution in September, 1827, and an assistant was engaged, Sergeant Anderson, of the Royal Artillery. He came on the 3rd of December."

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* Continued from page 196.

He had four papers in the *Quarterly Journal of Science*:—1. On the Fluidity of Sulphur and Phosphorus at common temperatures. "In this," he says, "I published some time ago (the year previous) a short account of an instance of the existence of fluid sulphur at common temperatures; and though I thought the fact curious, I did not esteem it of such importance as to put more than my initials to the account. I have just learned through the 'Bulletin Universel' for September, p. 78, that Signor Bellani had observed the same fact in 1813, and published it in the 'Giornale di Fisica.' M. Bellani complains of the manner in which facts and theories which have been published by him are afterwards given by others as new discoveries; and though I find myself classed with Gay-Lussac, Sir H. Davy, Daniell, and Bostock in having thus erred, I shall not rest satisfied without making restitution, for M. Bellani, in this instance, certainly deserves it at my hand." 2. On the probable decomposition of certain gaseous compounds of carbon and hydrogen during sudden expansion; 3. On transference of heat by change of capacity in gas; and 4. Experiments on the nature of Labarraque's disinfecting soda liquid. There were nineteen Friday evening meetings at the Royal Institution. Faraday gave an account of the magnetic phenomena developed by metals in motion, on the chemical action of chlorine and its compounds as disinfectants, and on the progress of the Thames Tunnel. In this year, he published his "Chemical Manipulations," in one volume, 8vo. A second edition appeared in 1830, and a third in 1842.

He was made a Correspondent of the Société Philomathique, Paris.

Æt. 36 (1828.)

He had a few words in the *Quarterly Journal* on anhydrous crystals of sulphate of soda. He gave four of the Friday evening lectures: Illustrations of the new phenomena produced by a current of air or vapour recently observed by M. Clement; on the reciprocation of sound; and also a discourse on the nature of musical sound. The matter belonged to Mr. Wheatstone, but was delivered by Mr. Faraday. The last evening was on the recent and present state of the Thames Tunnel.

He was made a Fellow of the Natural Society of Science of Heidelberg.

He was invited to attend the meetings of the Board of Managers of the Institution; and he received his first (gold) medal, one of a series of ten given to Members of the Royal Institution (as a reward for chemical discoveries) by Mr. John Fuller, a member.

Æt. 37 (1829).

He gave the Bakerian lecture at the Royal Society on the manufacture of glass for optical purposes.

This most laborious investigation led to no good in the direction that was originally expected, but the use of the glass manufactured, as described afterwards, became of the utmost importance in his diamagnetic and magneto-optical researches, and it led to the permanent engagement, in 1832, of Mr. Charles Anderson as Faraday's assistant in all his researches, "to whose rare steadiness, exactitude, and faithfulness in the performance of all that was committed to his charge, Faraday was much indebted."

He gave Friday evening discourses on Mr. Robert Brown's discovery of active molecules in bodies, either organic or inorganic; on Brard's test of the action of weather on building stones; on Wheatstone's further investigations on the resonances or reciprocal vibrations of volumes of air; on Brunel's block machinery at Portsmouth; on the phonical or nodal figures of elastic laminæ; on the manufacture of glass for optical purposes.

He was made a member of the Scientific Advising Committee of the Admiralty, Patron of the Library of the Institution, Honorary Member of the Society of Arts, Scotland.

At the end of June, he writes to Colonel Drummond, Lieutenant-Governor of the Royal Academy, Woolwich:—"I should be happy to undertake the duty of lecturing on chemistry to the gentlemen cadets of Woolwich, provided that the time I should have to take for the purpose from professional business at home were remunerated by the salary. . . . For these reasons (which he gives), I wish you would originate the terms rather than I. . . . I consider the offer a high honour, and beg you to feel assured of my sense of it. I should have been glad to have accepted or declined it, independent of pecuniary motives; but my time is my only estate, and that which would be occupied in the duty of the situation must be taken from what otherwise would be given to professional business."

At Christmas, he, for the first time, gave the Juvenile Lectures.

Æt. 38 (1830).

This year he had a paper in the Institution Journal, supplementary to his former paper in 1826, on the limits of vaporization.

His Friday evening discourses were on Aldini's proposed method of preserving men exposed to flame; on the Transmission of Musical Sounds through solid conductors, and their subsequent reciprocation; on the Flowing of Sand under Pressure; on the application of a New Principle in the Construction of Musical Instruments; on the laws of Co-existing Vibrations in strings and rods, illustrated by the kaleidophone.

The following recollections from about 1823 to 1830 are by Mrs. Faraday's youngest brother, Mr. George Barnard, the artist:—

"All the years I was with Harding, I dined at the Royal Institution. After dinner, we nearly always had our games just like boys—sometimes at ball, or with horse chestnuts instead of marbles, Faraday appearing to enjoy them as much as I did, and generally excelling us all. Sometimes we rode round the theatre on a velocipede (and tradition remains that, in the earliest part of a summer morning, Faraday has been seen going up Hampstead-hill on his velocipede).

"At this time, we had very pleasant conversaziones of artists, actors, and musicians at Hullmandel's, sometimes going up the river in his eight-oar cutter, cooking our own dinner, enjoying the singing of Garcia and his wife and daughter (afterwards Malibran), indeed of all the best Italian singers, and the society of most of the Royal Academicians, such as Stanfield, Turner, Westall, Landseer, etc.

"After Hullmandel's excellent suppers, served on a dozen or two small tables in his large rooms, we had charades, Faraday and many of us taking parts with Garcia, Malibran, and the rest.

"My first and many following sketching trips were made with Faraday and his wife. Storms excited his admiration at all times, and he was never tired of looking into the heavens. He said to me once, 'I wonder you artists don't study the light and colour in the sky more, and try more for effect.' I think this quality in Turner's drawings made him admire them so much. He made Turner's acquaintance at Hullmandel's, and afterwards often had applications from him for chemical information about pigments. Faraday always impressed upon Turner and other artists the great necessity there was to experiment for themselves, putting washes and tints of all their pigments in the bright sunlight, covering up one half, and noticing the effect of light and gases on the other.

"On one of our sea-side excursions we were bathing together, when Faraday, who was a fair swimmer, on coming in was overtaken by a tremendous wave which overtopped his head, and dashed him with violence on the beach, bruising him much. He impressed on me never to think any one could stand against such a breaker; that one should turn round and dive through it, throwing one's self off the ground. Faraday did not fish at all during these country trips, but just rambled about geologizing or botanizing."

If Faraday's scientific life had ended here, it might well have been called a noble success. He had made two leading discoveries—the one on electro-magnetic motions, the other on the condensation of several gases into liquids. He had carried out two important and most laborious investigations on the alloys of steel, and on the manufacture of optical glass. He had made many communications to the Royal secondary piles, De la Rive and Van Beck's peculiar properties of the poles of a voltaic pile, that I should not wonder if they all proved ultimately to depend on this state. The condition of matter I have dignified by the term *Electrotonic*, THE ELECTROTONIC STATE. What do you think of that? Am I not a bold man, ignorant as I am, to coin words? but I have consulted the scholars, and now for IV.

"IV. The new state has enabled me to make out and explain all Arago's phenomena of the rotating magnet or copper plate. I believe, perfectly; but as great names are concerned (Arago, Babbage, Herschel, etc.), and as I have to differ from them, I have spoken with that modesty which you so well know you and I and John Frost * have in common, and for which the world so justly commends us. I am even half afraid to tell you what it is. You will think I am hoaxing you, or else, in your compassion, you may conclude I am deceiving myself. However, you need do neither, but had better laugh, as I did most heartily, when I found that it was neither attraction nor repulsion, but just one of my *old rotations* in a new form. I cannot explain to you all the actions, which are very curious; but in consequence of the electrotonic state being assumed and lost, as the parts of the plate whirl under the pole, and in consequence of magneto-electric induction, currents of electricity are formed in the direction of the radii,—continuing, for simple reasons, as long as the motion continues, but ceasing when that ceases. Hence, the wonder is explained that the metal has powers on the magnet when moving, but not when at rest. Hence is also explained the effect which Arago observed, and which made him contradict Babbage and Herschel, and say the power was repulsive; but, as a whole, it is really tangential. It is quite comfortable to me to find that experiment need not quail before mathematics, but is quite competent to rival it in discovery; and I am amazed to find that what the high mathematicians have announced as the *essential condition* to the rotation, namely, that *time is required*, has so little foundation, that if the time could by possibility be anticipated instead of being required, *i.e.*, if the currents could be formed *before* the magnet came over the place instead of *after*, the effect would equally ensue. Adieu, dear Phillips. Excuse this egotistical letter from yours, very faithfully."

Æt. 40 (1832).

The second series of Experimental Researches in Electricity was this year the Bakerian lecture on Terrestrial Magneto-electric Induction, and on the Force and Direction of Magneto-electric Induction generally.

His Friday discourses were (1) on Dr. Johnson's Researches on the Reproductive power of Planariæ; (2) recent experimental Investigation of Volta-electric and Magneto-electric Induction; (3) Magneto-electric Induction, and the explanation it affords of Arago's Phenomena of Magnetism exhibited by moving Metals; (4) Evolution of Electricity, naturally and artificially, by the inductive action of the Earth's Magnetism; (5) on the Crispation of Fluids lying on vibrating Surfaces; and on Morden's Machinery for manufacturing Bramah's locks.

He was made Hon. Member of Philadelphia College of Pharmacy, and of Chemical and Physical Society, Paris; Fellow of the American Academy of Arts and Sciences, Boston; Member of the Royal Society of Science, Copenhagen; D.C.L. of Oxford University; and he received the Copley Medal.

He collected the different papers, notes, notices, etc., published in octavo up to this year, and he added this preface to the volume:—"Papers of mine, published in octavo, in the *Quarterly Journal of Science* and elsewhere, since the time that Sir H. Davy encouraged me to write the 'Analysis of Caustic Lime.' Some, I think (at this date), are good, others moderate, and some bad; but I have put *all* into the volume, because of the utility they have been to me, and none more than the bad in pointing out to me in future, or rather after times, the faults it became me to watch and avoid. As I never looked over one of my papers a year after it was written without believing, both in philosophy and manner, it would have been much better done, I still hope this collection may be of great use to me."

In December, the Royal Institution being in trouble, a committee reported on all the salaries:—"The committee are certainly of opinion that no reduction can be made in Mr. Faraday's salary (£100 per annum), house, coals, and candles, and beg to express their regret that the circumstances of the Institution are not such as to justify their proposing such an increase of it as the variety of duties which Mr. Faraday has to perform, and the zeal and ability with which he performs them, appear to merit."

Æt. 41 (1833).

The third series of Experimental Researches contained the Identity of Electricities derived from different sources, and the relation by measure of common and voltaic electricity. The fourth series consisted of a new law of Electric Conduction, and on Conducting-power generally. The fifth series was on Electro-chemical Decomposition, new conditions of Electro-chemical Decomposition, influence of Water in Electro-chemical Decomposition, and Theory of Electro-chemical Decomposition. The sixth series was on the Power of Metals and other Solids to induce the combination of gaseous bodies.

He sent a short note to the editors of the "Philosophical Magazine" on a means of preparing the Organs of Respiration so as considerably to extend the time of holding the breath, with remarks on its application in cases in which it is required to enter an irrespirable atmosphere, and on the precautions necessary to be observed in such cases.

His Friday discourses were on the Identity of Electricity derived from different sources; on the Practical Prevention of Dry Rot in Timber; on the Investigation of the Velocity and Nature of the Electric Spark and Light by Wheatstone; on Mr. Brunel's New Mode of Constructing Arches for Bridges; on the Mutual Relations of Lime, Carbonic Acid, and Water; on a New Law of Electric Conduction; and on the Power of Platina and other solid substances to determine the combination of gaseous bodies.

In the early part of the year, Mr. Fuller had founded a professorship of chemistry at the Royal Institution, with a salary of about £100 a year. Mr. Faraday was appointed for his life, with the privilege of giving no lectures. He was made Corresponding Member of the Royal Academy of Sciences of Berlin, and Hon. Member of the Hull Philosophical Society.

Æt. 42 (1834).

The seventh series of Experimental Researches was on Electro-chemical Decomposition (continued); on some general conditions of Electro-Decomposition; on a new measure of Volta Electricity; on the Primary and Secondary character of bodies evolved in Electro-Decomposition; on the definite nature and extent of Electro-chemical Decomposition; on the absolute quantity of Electricity associated with the particles or atoms of Matter.

The eighth series was on the Electricity of the Voltaic Pile, its source, quantity, and general characters; on simple Voltaic Circles; on the Intensity necessary for Electrolyzation; on associated Voltaic Circles on the Voltaic Battery; on the resistance of an Electrolyte to Electrolytic Action; general remarks on the active Voltaic Battery. The ninth series was on the influence by induction of an Electric Current on itself, and on the inductive action of Electric Currents generally.

He gave four Friday discourses, the first on the principle and action of Ericsson's Caloric engine. The other lectures were on Electro-chemical Decomposition; on the definite action of Electricity; and on new applications of the products of Caoutchouc.

He was made Foreign Corresponding Member of the Academy of Sciences and Literature of Palermo.

SALE OF POISONS.

COPY OF A "CASE" RAISING POINTS SUBMITTED TO THE PRIVY COUNCIL BY THE COUNCIL OF THE PHARMACEUTICAL SOCIETY FOR LEGAL ADVICE AND OPINION.

THERE is difficulty in the construction of the Pharmacy Act, 1868, upon those items in the Schedule A which are as follows:—

In Part I. Arsenic and its preparations.
Aconite and its preparations.
Ergot of Rye and its preparations.

---

* A pushing acquaintance, who, without claim of any kind, got himself presented at Court.

In Part II. Belladonna and its preparations.
Opium, and all preparations of opium or of poppies.

Other poisons appear in each part of the schedule without special reference to their preparations; they are—

Prussic Acid.
Cyanide of Potassium and all metallic cyanides.
Strychnine and all poisonous vegetable alkaloids and their salts.
Emetic Tartar.
Corrosive Sublimate.
Savin and its oil.
Oxalic Acid.
Cantharides.
Essential Oil of Almonds.

Some of the last-mentioned poisons form compounds, and are ingredients in articles in common use, called by proper names—as, for instance, tartar emetic is an ingredient in an article called antimonial wine.

Section 2 of the Act contains a power under which articles not enumerated in the schedule may be made "poisons" within the meaning of the Act, so that, whether preparations of prussic acid and other poisons scheduled in like manner, are in strictness poisons within the meaning of the statute or not, there is clear power for making them so by a course of action on the part of the Privy Council and the Pharmaceutical Society; but the statute does not contain any provision for the converse of the case, and therein lies the difficulty. There is an absence of any power under which any authority under Parliament can declare that an article, being a preparation of arsenic, or aconite, or ergot of rye, or belladonna, or of opium, or of poppies, is not a poison within the meaning of the Act; and it is, therefore, material clearly to ascertain the meaning of the statutory word "preparations," as used in the schedule.

Opium presents an illustrative or test case. The British Pharmacopœia is a publication issued under the authority of the Medical Act, and is particularly referred to in section 15 of (but not elsewhere in) the Pharmacy Act, 1868. The reference in section 15 is as follows:—"Any person . . who shall compound any medicines of the British Pharmacopœia excepting according to the formularies of the said Pharmacopœia shall, for every such offence, be liable to pay a penalty or sum of £5."

The British Pharmacopœia contains a heading "Opium," and under it certain directions, then a description of the article and its dose, and then a sub-heading, "Preparations," under which there is a long list, from which the following may be selected:—"Tinctura Camphoræ Composita, 2 grains to 1 fluid ounce;" "Tinctura Opii, 33 grains to 1 fluid ounce."

2 grains to 1 fluid ounce is practically the proportion of 1 in 240; 33 grains to 1 fluid ounce is the proportion of 1 to 14.

In another part of the British Pharmacopœia (and in its order) there appears a distinct heading "Tinctura Camphoræ Composita—Compound Tincture of Camphor," and a statement of the ingredients of which it is to be composed, showing opium in the above-stated proportion of 1 in 240. Also in another part of the same book (and in its order) there appears another distinct heading "Tinctura Opii—Tincture of Opium," and a statement of the ingredients, showing opium in the proportion above stated of 1 in 14.

Thus, although tinctura camphoræ composita and tinctura opii are, in the list of preparations, under the heading opium, elsewhere in the same Pharmacopœia the one is described by a name in which opium does not form part, and the other is described as tincture of opium.

The British Pharmacopœia has been thus referred to as speaking with a weight of authority, but it should be noticed that to accept it as conclusive may lead to error, since the compilers of the Pharmacopœia may, and in practice do, make alterations therein; and it clearly was not the intention of Parliament to give the compilers of the Pharmacopœia authority to change the status of an article, and thus expand or contract the list of Poisons.

The Pharmacy Act, 1868, is open to the observation that it comprises two classes of provisions,—the one class in restraint of trade, by imposing penalties on the sale of poisons by persons not registered under the Act, and thus, according to the rules of construction, to be construed *strictissimus* against the registered persons; the other class, enacting penalties on sales of poisons by the registered persons if not made in accordance with certain prescribed formalities and according to the usual rules of construction, to be construed *strictissimus* in favour of the same registered persons. So far as the Act creates a monopoly, it may, *primâ facie*, appear to the interest of registered persons that the widest construction shall be put upon the word preparations; but as a matter of convenience in the conduct of sales of poisons, and practically in the general interest of the registered persons and the public, it is most undesirable that a very extended meaning shall be given to the words "poison" and "preparations;" moreover, public safety will, in all probability, be best secured by a limited construction of the words.

A class of cases at common law have been decided upon the general question, how far articles of merchandise maintain or change their mercantile descriptions—as, for instance, how long grain remains properly described as wheat, notwithstanding the presence of proportions of grain not wheat. The class of cases may aid in the considerations above suggested, say on the question whether, when an article such as compound tincture of camphor contains, as an ingredient, a very small proportion of opium, it is for all the purposes of the Act (if for any it must be for all) a preparation of opium.

Compound tincture of camphor is commonly called Paregoric; it is a useful popular medicine for coughs, and for the statutory requirements respecting poisons to be complied with on sales of paregoric would not only be prejudicial as alarming patients about taking a useful, simple, medicine, but would go far to destroy the value of the word "poison" through too common use; applying the word poison to this and some other harmless preparations, which cannot correctly be deemed poisons at all according to the common acceptation of the term, would naturally lead the public to regard the poison label as a mere formality.

If it can be relied upon that a limited construction will be put upon the words "poison" and "preparations," it will be practicable to work the statute without further Parliamentary powers, because the case illustrated by strychnine can be covered by the exercise of the statutory powers created by Section 2, under which the Privy Council and the Pharmaceutical Society can declare that compositions containing any given proportions of strychnine shall be deemed poisons within the meaning of the statute.

In stating the foregoing, the endeavour has been to disclose the difficulty and raise the points with a view to suggestions under the authority of the Privy Council to the Pharmaceutical Society, if such can be given.

COPY OF REPLY.

Medical Department of the Privy Council Office,
6th March, 1869.

The Secretary of the Pharmaceutical Society, 17, Bloomsbury Square, W.C.

Sir,—I have laid before the Lords of Her Majesty's Council the statement prepared for that purpose by the Solicitors of the Pharmaceutical Society, and put into my hands by the President of the Society, on the subject of a difficulty which the Society feels in applying the language of the Pharmacy Act, and particularly of its Schedule A, to the case of such pharmaceutical compounds as contain some scheduled "poison" in extremely small and practically non-poisonous quantity.

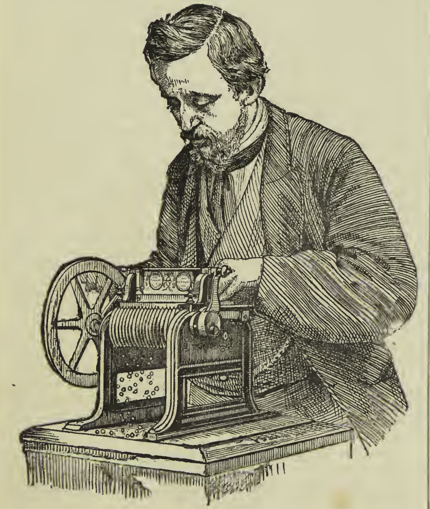
My Lords, having given their best consideration to the subject, are of opinion that the "preparation" of a poison in the Pharmacy Act, 1868, means a compound which, like the poison of which it is a preparation, is in itself deadly or dangerous, and that it does not mean a compound which is in itself perfectly harmless, although into its composition may enter a poison, or the preparation of a poison, which taken alone would be dangerous or deadly. My Lords apprehend that questions of fact must be dealt with as they arise; for it is possible to take so much of a compound, perfectly harmless if taken in reasonable quantities (*e.g.*, carbonate of soda), as to destroy life, and it is possible that a particular paregoric lozenge might contain a deadly amount of poison; but it seems to their Lordships that, for general purposes, and as matter of legal interpretation, these extreme and barely supposable cases may be disregarded, and that the Pharmaceutical Society may safely act upon the test given above.

My Lords, however, are advised that it is not feasible to define the precise proportion of poison in any preparation which may bring it within the Act.

I am, sir,
Your obedient servant,
John Simon.

BUSHBY'S PILL MACHINE.

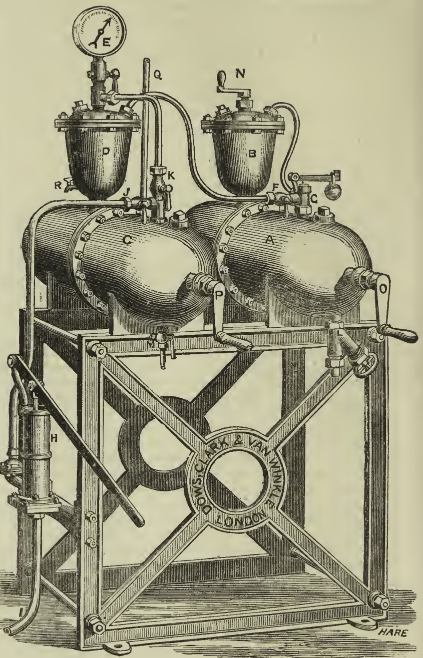
Since Messrs. Bailey and Co., of Salford, have become the agents for the above, they have improved it in several particulars. The subjoined engraving represents the machine as it is now manufactured, rolling a thousand pills per minute. The attractive appearance of the machine is evident from the engraving, and although the principle has not been altered, the present model compares very favourably in points of construction with the one we find described in November, 1868.



BUSHBY'S PILL MACHINE.

DOWS, CLARK, AND VAN WINKLE'S UNIVERSAL SODA-WATER MACHINE.

The ice-cream soda-water apparatus which was fully described in the columns of this journal fourteen months ago has been extensively employed in this country for the gratification of thirsty souls, and the odd combination of ice-shavings, cream, fruit-syrup, and aërated water is generally admitted to be a realised " happy thought." Messrs. Dows, Clark, and Van Winkle, encouraged by the success of their efforts to introduce a novel system of preparing summer beverages, have just produced a cheap and compact machine for making aërated water specially adapted for supplying their elegant draught apparatus, but also capable of sustaining a limited business in bottled waters. The new machine bears a striking resemblance to the apparatus employed by Thilorier for liquefying "carbonic acid," and consists essentially of two strong cylindrical vessels mounted on an iron frame. In one of these vessels the gas is generated by the action of sulphuric acid on a carbonate, and in the other the condensed gas is agitated with water. The machine requires no gasometer, and its action is independent of any mechanical power beyond that required for turning the agitator in the condenser. The construction of the machine will be readily understood on examining our engraving, to which the following references apply:—The cylinder marked A is the *generator*—into this vessel the carbonate employed (either whiting, marble-dust, or "bicarbonate of soda") is introduced, with the requisite quantity of water, through the top opening by means of a funnel. The oil of vitriol, or sulphuric acid, is then poured into the *vitriol-pot*, B, care being taken that the shut-off valve at the bottom of the pot is closed. This valve is worked by the handle, N. The vitriol-pot and the generator, both of which are lined with thick lead, are then perfectly closed by screwing down the brass nuts which are adapted to the openings. The small tube connecting the vitriol-pot and the generator equalize the pressure, and thus permits the acid to flow from the former to the latter when the shut-off valve is open. The vessel marked C is called the *cylinder*, or *condenser*. It is lined with pure tin, and contains the water or the solution of soda



UNIVERSAL SODA-WATER MACHINE.

which is to be saturated with gas. The charge is four-and-a-half imperial gallons. It is introduced through a screw opening at the top of the cylinder corresponding to that through which the whiting is introduced into the generator. The vessel marked D, which is called the *washer*, is three-quarters full of water, and serves to purify the "carbonic acid gas." It represents the hydraulic main of a gas factory and the wash-bottle in the gas apparatus of the laboratory.

Cold water dissolves about its own volume of carbonic acid gas, whatever be the density of the gas with which it is in contact; in other words, the quantity of the gas dissolved is proportional to the pressure. In the machine now under consideration, the pressure required to give a solution which sparkles and bubbles when relieved from pressure is attained by simply preventing the expansion of the disengaged gas. As the gas is generated in a close, strong vessel, its pressure necessarily increases, and when the requisite pressure is indicated by the gauge, E, its further increase is checked by shutting off the vitriol supply. The absorption of the gas by the water is hastened by agitation, and in preparing soda-water with this machine the liquid and gas are agitated together by turning the handle, P.

The following details of the mode of operation will convince our readers that the art of making soda-water is greatly simplified by the use of this machine:—

1. Into the cylinder, C, pour 4½ gallons of cold water, and screw down the nut.

2. Into the purifier, D, pour half a gallon of water; this water is to be changed after each operation, by drawing it off by the tap, R.

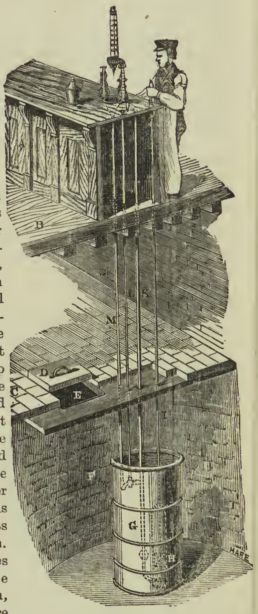
3. After carefully closing the vitriol-pot, B, by turning the shut-off, N, pour in 3 quarts of oil of vitriol, through a glass or earthen vessel. Screw down the nut tight.

4. Pour into the generator, A, 2½ gallons of water, then with a wide-nozzle funnel pour in 18 lbs. of whiting; when it is all in screw down the nut tight.

5. After turning the agitator, O, let down a small quantity of vitriol, from time to time turning the agitator between the additions; see that the shut-off, F, is open, as well as that on the gauge, E. Keep the hand on the shut-off, N, while the vitriol is running, and watch the gauge, to shut the vitriol off at a proper pressure; the bubbling of the gas, as it escapes from the whiting, will be heard; the vitriol should be let in in small quantities at a time. When the pressure stands at 100 lbs., the shut-off, K, may be opened gently; the gas then passes from the generator, A, through the pipe to the bottom of the washer, D, bubbles up to the surface, and then through the pipe, K, to the bottom of cylinder, C; the absorption will be hastened by turning the agitator, P, rapidly in each direction. This will reduce the pressure greatly. Then by shutting off at K, and letting in more vitriol, and turning the agitator, O, increase the pressure to 150 lbs.; then open at K, and agitate as before. Then leaving shut-off, K, open, add gradually more vitriol, until the gauge indicates 180 lbs., after well agitating the water in cylinder, C. The soda-water is then ready for use, either for connecting with the Marble Draught Apparatus or Ice Cream Soda-water Apparatus, by means of the pipe, Q; or it may be attached, by means of the rubber pipe, I, to the bottling machine, or syphon filler. A single charge of the cylinder equals about 100 bottles or glasses. When the cylinder is nearly empty, which is shown by the glass water gauge to the right of the cylinder, it may be refilled, without the loss of gas, in three minutes, by means of the pump, H. By pumping the water through suction-pipe, I, leading to a vessel containing 4½ gallons of water, then by opening shut-off, K, and letting on sufficient vitriol to again indicate 180 lbs., the cylinder is again full of pure soda-water, the generator, A, and vitriol-pot, N, holding sufficient material to make four of the cylinders of soda-water, or 18 gallons.

It will be evident from this description that the machine introduced by Messrs. Dows, Clark, and Van Winkle resembles in some respects the earliest form of soda-water apparatus; and it must be owned that for the purposes of large manufacturers it cannot be profitably substituted for the continuous-process machine. For manufacturing soda-water on a small scale, either for bottling or for supplying the marble draught apparatus, it has, however, many obvious advantages. It occupies little space, and can be worked with a small expenditure of manual labour. The addition of the force-pump H, by means of which the cylinder can be refilled without waste of gas, and the device of directly connecting the cylinder with the draught apparatus, give this machine a character quite distinct from that of the old "batch" machine of the ante-Bramah age. With regard to the safety of this machine there need be no question, for it is very strongly constructed, and in addition to the pressure-gauge, it is provided with an effective safety-valve.

FORREST'S PATENT MEASURE AND SAFETY WELL FOR STORING MINERAL OILS.



In our advertising pages is shown a drawing of an elegant measuring apparatus suitable for any counter, and by the use of which any quantity of fluid can be accurately measured and drawn off, without the possibility of a single drop escaping. In the accompanying sketch the same measure is shown on a smaller scale, and in connection with a cistern, G, which, on examination of the engraving, will be seen placed in a well-tank underneath the cellar floor. The first pipe, I, is the pump handle, worked at the counter, and the fluid is forced up the next tube, K, into the measure, the required quantity being at once indicated by the counter apparatus, which is graduated by half-pints up to half a gallon. Any overflow of bottles is returned through the tube, M, to the cistern, perfect safety being here ensured by turning a stop-cock in the cistern with the iron rod, L. It should be noted that the measure has a wire-gauze cover, and as it would be manifestly impossible for any fire to pass down the tubes, M or K, the most complete security is afforded. We think there are many of our country subscribers who will examine our sketch with much interest, and we leave it for them to appreciate the practical value of what appears to us to be a very perfect arrangement.

PALMER'S PURIFIED SEA SALT.

SEA salt itself is certainly no novelty, either in the "foaming billows" or in bags and boxes. The novelty in this case depends on the fact that the salt is entirely free from the rusty and dirty colour hitherto characteristic of some varieties of the article, and makes a perfectly clean solution. The process by which Mr. Palmer produces this result also gives another advantage which the retailer will value, which is the non-deliquescence of the salt, thus giving improved cleanliness in every direction.

Corner for Students.

CONDUCTED BY J. C. BROUGH, F.C.S.

QUESTIONS.

I. CHLORINE.—Describe the effects produced by chlorine on the following substances—indigo solution, copper foil, powdered antimony, powdered charcoal, phosphorus, and sulphur.

II. VINEGAR.—A sample of vinegar is supposed to be adulterated with sulphuric acid. How would you ascertain the presence of sulphuric acid in the vinegar?

III. LIQ. AMMONIÆ FORTIOR, *B.P.*—Check the statement that one fluid drachm of this solution contains 15·83 grains of ammonia, by the result of the volumetric test. Explain the tests of purity.

IV. ARGENTI OXIDUM, *B.P.*—Suppose that the product of the prescribed process were decomposed by heat, and the evolved gas collected, what would be the volume of gas, in litres, at 12° C. and 750 mm?

V. ARGENTI NITRAS.—Find the weight of pure nitric acid HNO_3 required to convert the residual silver of the operation referred to in Problem IV. into silver nitrate. Express the weight in *grammes.*

VI. STANDARD GAS VOLUME.—What is the length of the edge of a cube corresponding in volume to 11·19 litres? Give the result in millimetres.

VII. SPECIFIC GRAVITY.—When a piece of tin weighing 37 lbs. is immersed in water, it weighs 32 lbs. When a piece of lead weighing 23 lbs. is immersed, it weighs 21 lbs. A certain alloy of lead and tin, weighing 120 lbs. in air, weighs 106 lbs. in water. Find the proportion of lead to tin in the alloy.

VIII. DOUBLE DECOMPOSITION.—A solution of barium nitrate is added to a solution of sodium sulphate, and the precipitated barium sulphate is collected, dried, and weighed. Supposing that each solution corresponded to one ounce of the anhydrous salt, what would be the weight of the precipitate in grains?

IX. HYDRARGYRI IODIDUM RUBRUM.—Give a process for preparing this compound, which does not involve solution and precipitation.

X. SPECIFIC GRAVITY OF PHOSPHORUS.—A piece of phosphorus weighs 48·5 grains when immersed in water. What is its weight in air?

ANSWERS.

[*See Questions in March number, page* 197.]

I. LIQ. BISMUTHI ET AMMONIÆ CITRATIS, *B.P.*—The black precipitate obtained on treating the diluted solution with sulphuretted hydrogen is *bismuth trisulphide* ($Bi_2S_3=516$). The quantity obtained from three fluid drachms of the solution is 9·92 grains. The corresponding quantity of *bismuth trioxide* ($Bi_2O_3=468$) is 8·997 grains, for

$$516 : 468 = 9{\cdot}92 : 8{\cdot}997$$

This result, giving very nearly 9 grains of oxide to three fluid drachms, is consistent with the statement that one fluid drachm of the solution contains 3 grains of oxide of bismuth.

II. MORPHIÆ ACETAS, *B.P.*—The weight of the product is 803·928 grains.

In the prescribed process the morphia contained in 875 grains of hydrochlorate is converted into the acetate. We learn from the molecular weights of the two salts that 375·5 grains of the hydrochlorate ($C_{17}H_{19}NO_3.HCl.{}_3H_2O = 375{\cdot}5$) would be required to yield 345 grains of the acetate ($C_{17}H_{19}NO_3.C_2H_4O_2=345$); therefore the product of 875 grains is found by the proportion:

$$375{\cdot}5 : 875 = 345 : x$$
$$\therefore x = 803{\cdot}928 \text{ grains.}$$

III. POTASSII BROMIDUM, *B.P.*—By the reaction of bromine and caustic potash we obtain potassium bromide together with *potassium bromate* and water, according to the following equation:

$$3Br_2 + 6KHO = 5KBr + KBrO_3 + 3H_2O.$$

When the residue of the evaporation is mixed with charcoal and ignited, the *bromate* is deoxidised and converted into bromide, carbon dioxide being produced, thus

$$2KBrO_3 + C_3 = 2KBr + 3CO_2.$$

IV. ANTIMONETTED HYDROGEN.—The black substance precipitated on passing antimonetted hydrogen into a solution of silver nitrate is *silver antimonide,* Ag_3Sb.

V. AMMONIA.—Hydrochloric acid and ammonia combine to form ammonium chloride:

$$HCl + NH_3 = NH_4Cl.$$

Ferric chloride and ammonia, with water, give ferric hydrate, which is precipitated, and ammonium chloride, which remains in solution:

$$Fe_2Cl_6 + 6NH_3 + 6H_2O = Fe_2(HO)_6 + 6NH_4Cl.$$

The composition of the hydrate varies according to the degree of dilution and the temperature of the reacting bodies.

Sulphuric acid and ammonia combine to form ammonium sulphate: $H_2SO_4 + 2NH_3 = (NH_4)_2SO_4.$

Calcium chloride and ammonia, with water, give calcium hydrate and ammonium chloride:

$$CaCl_2 + 2NH_3 + 2H_2O = Ca(HO)_2 + 2NH_4Cl.$$

No precipitate is formed with a dilute solution, the calcium hydrate being soluble in water.

Lead nitrate and ammonia, with water, give a basic lead nitrate and ammonium nitrate. The composition of the basic salt varies according to the conditions under which it is precipitated; supposing it to be the salt $Pb(HO)NO_3$, the reaction may be thus expressed:

$$Pb(NO_3)_2 + NH_3 + H_2O = Pb(HO)NO_3 + NH_4NO_3.$$

Cupric chloride and ammonia, with water, give cupric hydrate as a pale blue precipitate, and ammonium chloride:

$$CuCl_2 + 2NH_3 + 2H_2O = Cu(HO)_2 + 2NH_4Cl.$$

The hydrate dissolves in an excess of ammonia, yielding an intense purplish blue solution of an ammoniacal copper chloride.

VI. GASES.—The theoretical specific gravities of the gases named, referred to atmospheric air as unity, are

Ammonia	·5865
Marsh gas	·552
Chlorine	2·4495
Carbon dioxide	1·518
Nitrogen monoxide	1·518

The molecular weights corresponding to the formulæ NH_3, CH_4, Cl_2, CO_2, and N_2O, are the relative weights of equal double volumes, taking the weight of the single volume of hydrogen as the unit. Half the molecular weight of each gas, therefore, represents its specific gravity referred to hydrogen. If, then, we multiply half the molecular weight by ·069, we shall obtain the specific gravity referred to atmospheric air as unity.

VII. CYANOGEN.—The volume of air required for the combustion of a litre of cyanogen is 9·61 litres; the products of the combustion are 2 litres of carbon dioxide and 1 litre of nitrogen.

The reaction may be thus expressed with molecular formulæ:

$$\underbrace{C_2N_2}_{\text{2 vols.}} + \underbrace{2O_2}_{\text{4 vols.}} = \underbrace{2CO_2}_{\text{4 vols.}} + \underbrace{N_2}_{\text{2 vols.}}$$

Each volume of cyanogen requires 2 volumes of oxygen for complete combustion; then as the percentage of oxygen in the air is 20·81 by measure, the volume of air needed to yield 2 litres of oxygen is 9·61 litres, for

$$20{\cdot}81 : 2 = 100 : 9{\cdot}61.$$

VIII. SILVER FULMINATE.—The volume of the mixed gases from 1 *gramme* of silver fulminate, if measured at 14·5 C. and 757 mm., would be 0·2366 litres.

From the equation

$$Ag_2C_2N_2O_2 = Ag_2 + \underbrace{2CO}_{\text{2 vols.}} + \underbrace{N_2}_{\text{2 vols,}}$$

we learn that 300 *grammes* yield 44·76 litres of carbon monoxide and 22·38 litres of nitrogen at the standard temperature and pressure. The volume of the mixed gases obtainable from 1 *gramme* is found by the proportion:

$$300 : 1 = 67{\cdot}14 : x ; \therefore x = {\cdot}2238 \text{ litres.}$$

The corresponding volume at 14·5° C., but still at the standard pressure, may be found thus:

$$273 : 273 + 14{\cdot}5 = {\cdot}2238 : x ; \therefore x = 2357 \text{ litres.}$$

This volume is thus corrected for the pressure of 757 mm.:

$$757 : 760 = 2357 : x ; \therefore x = {\cdot}2366$$

[In the problem the compound gas was, by a *lapsus stili*, termed carbon dioxide. Luckily the mistake does not affect the results obtained by those who have brought the oxygen of the air into the reaction, for CO and CO_2 have the same volume.]

IX. Potassium Chlorate.—The gas evolved on treating potassium chlorate with concentrated sulphuric acid is chlorine tetroxide, Cl_2O_4.

The reaction is probably in accordance with the equation

$$3KClO_3 + H_2SO_4 = Cl_2O_4 + KClO_4 + K_2SO_4 + H_2O$$

the other products being potassium perchlorate, potassium sulphate and water.

X. Specific Gravity.—The weight of the water displaced by the zinc is 1 lb.

The sp. gr. of the zinc is 6·862, therefore a piece of the metal weighing 6·862 lbs. in air would displace 1 lb. of water, and lose 1 lb. of its weight. According to the question the piece weighs 5·862 lbs. when immersed, it is therefore evident that the weight of the equal bulk of water displaced is 1 lb.

PRIZES.

The First Prize for Solutions of Problems in our March number is awarded to

G. Welborn, Grantham Dispensary,

a student whose contributions invariably display the results of careful consideration and well-directed labour. He received a First Prize in August, 1868.

The Second Prize is awarded to

T. Wilson, 13, Finsbury-street, Leeds,

who has also taken a prize before.

The names of J. W. Evans and A. J. Pepper stand next to those of the prize-winners.

Marks awarded for Prizes.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	E.	Total.
Welborn (*1st prize*) ..	7	6	6	4	10	8	7	9	7	4	7	75
Wilson (*2nd prize*) ..	7	6	6	4	9	8	7	9	7	4	6	73
J. W. Evans	6	6	6	4	9	8	7	9	7	4	6	72
A. J. Pepper	7	6	7	4	9	8	7	9	5	4	6	72
A. E. I.	7	6	6	4	9	8	7	9	7	3	5	71
J. A. Kendall	7	6	7	4	8	8	0	9	7	4	7	67
H. Habgood	7	6	6	4	9	8	0	9	7	4	5	65
J. Treharne	7	3	6	4	10	8	0	9	7	4	6	64
A. P. S.	7	6	6	4	8	8	7	0	7	4	6	63
J. W.	7	6	7	4	10	8	0	6	7	4	4	63
Edina	6	6	6	4	8	8	7	6	7	—	4	62
A. Fraser	6	6	7	4	8	8	0	9	7	4	3	62
W. Lucas	7	6	6	4	8	8	0	8	7	4	2	60
Solus	7	5	6	0	9	8	0	9	7	4	5	60
J. B. N.	7	5	6	4	7	8	7	0	6	4	5	59
J. D. D. Thomas ..	7	6	6	4	10	8	0	6	7	0	4	58
Junior Apprentico ..	7	0	7	4	6	8	7	0	7	4	4	54
Tyro	6	6	6	4	6	1	0	8	7	4	4	52
J. Gregory	7	6	6	4	8	8	0	0	4	4	4	51
J. C. Thresh	7	6	6	4	8	8	0	0	4	4	3	50
Spero	5	6	6	4	8	4	6	0	6	3	0	48
J. Paulin	7	6	0	4	8	6	0	0	5	4	5	45
W. Greig	7	0	2	4	8	8	0	0	7	4	4	44
J. Tully	6	0	0	4	2	0	0	0	7	4	4	27
Contentus	—	0	3	—	6	6	—	—	0	—	0	15

Books offered as First Prizes.

Attfield's *Introduction to Pharmaceutical Chemistry.* (Van Voorst.)
Brooke's *Elements of Natural Philosophy.* (Churchill.)
Conington's *Handbook of Chemical Analysis;* with Tables of Qualitative Analysis adapted to the same. (Longmans.)
Eliot and Storer's *Manual of Inorganic Chemistry.* (Van Voorst.)
Fownes's *Manual of Elementary Chemistry, Theoretical and Practical* (Churchill.)
Fresenius's *Qualitative Analysis.* (Churchill.)
Ganot and Atkinson's *Elementary Treatise on Physics.* (Longmans.)
Garrod's *Materia Medica;* with Modern Chemical Notation. (Walton.)
Noad's *Chemical Analysis, Qualitative* and *Quantitative.* (Reeve.)
Northcote and Church's *Qualitative Analysis.* (Van Voorst.)
Royle and Headland's *Materia Medica.* (Churchill.)
Williamson's *Chemistry for Students.* (Clarendon Press.)

[Any other scientific book that is published at a price not greatly exceeding half-a-guinea may be taken as a first prize.]

Books offered as Second Prizes.

Barff's *Introduction to Scientific Chemistry.* (Groombridge).
Church's *Laboratory Guide for Students in Agricultural Chemistry.* (Van Voorst.)
Galloway's *First Step in Chemistry.* (Churchill.)
Hofmann's *Introduction to Modern Chemistry.* (Walton.)
Huxley's *Lessons in Elementary Physiology.* (Macmillan.)
Oliver's *Lessons in Elementary Botany.* (Macmillan.)
Potts's *Elements of Euclid.* School Edition. (Longmans.)
Roscoe's *Lessons in Elementary Chemistry.* (Macmillan.)
Wurtz's *History of Chemical Theory.* Translated by Watts. (Macmillan.)
Wurtz's *Introduction to Chemical Philosophy.* Reprinted from the "Chemical News."

[Any other scientific book which is sold for about five shillings may be taken as a second prize.]

REVIEWS

The Pharmacopœias of Seventeen of the London Hospitals, arranged in Groups for easy Reference and Comparison. By Peter Squire, F.L.S. John Churchill and Sons, New Burlington-street.

This little manual, which has reached a second edition, needs no praise of ours in order to recommend it, as the name of the writer is a guarantee for accurate and conscientious work. The list of Hospitals whose formulæ are given is as follows:—1, Charing Cross; 2, Consumption; 3, Diseases of the Chest; 4, Fever; 5, Guy's; 6, King's College; 7, London; 8, London Ophthalmic; 9, Middlesex; 10, St. Bartholomew's; 11, St. George's; 12, St. Mary's; 13, St. Thomas's; 14, University College; 15, Westminster Ophthalmic. These fifteen have been printed since the British Pharmacopœia. Two are reprints only, viz., 16, Skin; 17, Westminster. It will readily be perceived how extremely convenient it is to have all these grouped together, so as to afford means of instant reference. Diet Tables of six hospitals are appended. To the London dispenser such a compilation is of great service, if not indispensable, and we are told by those competent to judge that it will prove of value in the country. We learn with pleasure that a new edition (the seventh) of Mr. Squire's "Companion to the British Pharmacopœia," containing additional matter, is nearly ready. No treatise of higher utility or interest bearing on practical pharmacy has yet appeared since the publication of the "Pharmacologia" by the late Dr. Paris. We congratulate "the Chemist in Ordinary to the Queen" on having helped to upset the theory that business occupations are an effectual barrier to literary success.

Pure Wine, and How to know It. J. L. Denman, Piccadilly.

The public taste for pure wines has no doubt greatly improved in England since Mr. Denman first attacked the brandied mixtures which we had been in the habit of accepting as the juice of grapes. The pamphlet before us recalls the former discussions on this subject, and again draws our attention to the classically-named wines of Greece which Mr. Denman has been so successful in introducing.

Elliott's Wholesale and Retail Druggists' Price Book. Silverlock.

A word of praise must be accorded to this little work on account of the care shown in its compilation, as well as for the clearness and accuracy of the printing. To this edition (the third) has been added a table of calculations, showing the relative prices of ounces, pounds, and hundred-weights. This we consider superfluous, as such simple operations of arithmetic ought to be ready in the mind of every apprentice, or at least more quickly ascertained behind his eyes than before them.

BOOKS RECEIVED.

We have received the following important works, which will be discussed in a general article on Chemical Text Books in our next number:—

A History of Chemical Theory, from the Age of Lavoisier to the Present Time. By Ad. Wurtz. Translated by Henry Watts, B.A., F.R.S. (Macmillan.)

An Introduction to Scientific Chemistry; designed for the Use of Schools and Candidates for University Matriculation Examinations. By S. F. Barff, M.A., etc. (Groombridge.)

Lessons in Elementary Chemistry, Inorganic and Organic. By Henry E. Roscoe, B.A., F.R.S. New edition. (Macmillan.)

THE MONTH

LINCOLN CHEMISTS' ASSOCIATION.

THE concluding quarterly meeting of the session (October to March) was held in the Association's usual room in Silver-street, on Tuesday evening, the 30th ult. New officers, in place of retiring ones, were elected for the ensuing session, and the accounts passed, etc. Mr. C. Ekins was elected president, in place of Mr. J. C. Kite. Messrs. J. M. Parker and W. H. Woodcock were re-elected as vice-president and honorary secretary and treasurer respectively; Messrs. T. E. Harrison, W. Higgat (re-elected), and W. Hutton (re-elected) as councillors. The report also showed the Association to be in a prosperous condition. After the ordinary business of the evening was gone through, a unanimous vote of thanks was passed to Mr. J. S. Battle (an honorary member) for his gratuitous assistance in superintending the various manipulations in chemistry. In concluding the meeting, a vote of thanks was also accorded to the respective editors of the *Pharmaceutical Journal* and the CHEMIST AND DRUGGIST for the donation of their valuable journals. After which the meeting terminated.

THE MANCHESTER CHEMISTS' AND DRUGGISTS' ASSOCIATION.

SPECIAL MEETING, MARCH 19.

A SPECIAL meeting of the above Association was held at Union Chambers, on Friday, March 19th, Mr. W. S. BROWN, Vice-President, in the chair.

The CHAIRMAN, in opening the proceedings, said that the subject of "Prices" had occupied the attention of the Council for some time, and that, after considerable discussion, it had been decided that, for the present, it was not desirable to endeavour to form a complete Price List; the circumstances of various localities, and the demand differed so widely that it would be difficult to fix a uniform rate of charge. It was, however, felt that dispensing charges might be more uniform, and that, with every prospect of success, a list might be framed, and offered to the trade for adoption. To carry out this, the Council appointed a sub-committee, who, after several meetings and much consideration, agreed on, and submitted a list to the Council; it was then considered the proper course to submit it to the members of the Association generally, and to prevent any interference with the paper promised by Mr. Slugg for the next meeting, and to afford an opportunity for fuller discussion, this special meeting had been summoned. After expressing gratification at the numerous attendance, and the hope that in discussing this important subject every member would endeavour to aid in promoting the uniformity of charge, and thus attain a most desirable end, he said the prices in the list were, for the most part, not higher than had been customary in leading dispensing establishments, and would be readily obtained. For small quantities of medicines, the charge hitherto made had been most inadequate; justice demanded that the chemist, in his improved legal position, and with the resulting increased demand for superior acquirements, should be remunerated on a more liberal scale than heretofore. It was not intended that the members of the trade who agreed to the new list of prices should be absolutely bound by it; the utmost liberty of action was desired, the obligation being simply one of honour, and no member would incur penalties, or any other form of visitation, by deviating from the fixed charge, when he, in his discretion, saw sufficient reason. Self-interest would induce the making of the full charge where practicable; at the same time, the importance of the movement, and the pains taken by the committee, induced a hope that if the list be adopted, it would be observed as strictly as possible. After explaining the advantages and importance of using a universal "Price Mark," which being marked on the prescription by the first dispenser, became a guide to all subsequent ones, the chairman proceeded to read the list, and to fully explain the reasons which had led to deviation from the old prices, where such proposed changes appeared. Urging unanimity of feeling, at the same time inviting the fullest and most open discussion, he submitted the list for adoption.

Mr. L. SIEBOLD said that he did not approve of making any lower charge for dispensing than 1s. He thought one, two, or three pills should be worth that; he also did not see why pills, when prescribed with a mixture, should be charged less than when prescribed alone. The trouble, care, and responsibility connected with the dispensing of a prescription was certainly worth that trifling amount. Since the passing of the Pharmacy Act, chemists were beginning to look upon themselves as professional men; but he could not help thinking that 3d., or even 6d., for making up a box of pills was not the charge of a scientific chemist, but that of an ignorant shopkeeper. He very much regretted that a price list drawn up thirty-five years ago should form the basis for the charges now to be adopted. Drugs commanded a higher price, the cost of living had increased very considerably, and, above all, a large number of very expensive chemicals were now used in dispensing, whilst the prescriptions of former times generally contained substances of comparatively trifling value. He thought the price list just read did not correspond with the views so ably advocated in Mr. Hampson's paper. Assistants were now compelled to pass an examination. Most of them would, probably, pass it before long; and when they came to calculate the heavy expenses incurred for lectures, books, examination fees, etc., and when they began to feel their superiority acquired by scientific training, they would then, as a matter of course, demand a very considerable increase in their salaries; and, in order to pay higher salaries, chemists would be obliged to charge higher prices. They had, therefore, to choose now between adopting at once a scale of reasonable and remunerative charges, or doing so after a year or two, at the dictation of the assistants.

Mr. J. T. SLUGG,* Mr. WATERHOUSE (Ashton), Mr. GILL (Pendleton), and other gentlemen, then spoke on the subject.

In reply to a previous speaker, who, before adopting the list, urged the desirability of a canvass being made of the chemists of surrounding towns, Mr. HAMPSON expressed the opinion that so large an undertaking was impracticable, and did not come within the scope of the Association. He recommended the chemists in those towns to meet together to discuss and, if possible, to agree to the list. He strongly solicited the unanimous adoption of the list as a precedent, and a basis for a more perfect scheme, which experience would, doubtless, render necessary.

After much discussion, the scale of charges was unanimously adopted.

Mr. ROBINSON (Pendleton) then proposed, and Mr. BODEN (Patricroft) seconded, "That members of the Association endeavour, in their respective districts, to secure the co-operation of the members of the trade in making charges according to the scale." Carried unanimously.

A vote of thanks to the chairman terminated the proceedings.

Your Council, being impressed with the very irregular and, in many cases, inadequate rates charged for dispensing in Manchester and the district, and the desirability and importance of promoting a more uniform and remunerative system, appointed a sub-committee, which, after much deliberation, prepared the accompanying list. It has been approved by the Council, and adopted by the Association at the Special Meeting, held March 19th, 1869.

Those who are willing to carry out the scale proposed, and to give in their names to the Secretary, will not be bound, in all cases, to charge the full rates, latitude being allowed to each to suit the requirements of his district; but it is hoped that the scale of charges will be widely adopted and generally adhered to, uniformity being the most essential improvement aimed at.

The Committee would direct especial attention to the hitherto ridiculously small charges for prescriptions for very limited quantities, and urge the adoption of the rates recommended, on the ground of responsibility, which is as great on small as on larger quantities of medicines dispensed.

It also strongly urges the necessity in every case, whether the full list price be obtained or not, that the *Private*

Price Mark be used, so as to indicate the charge. The constant carrying out of this arrangement will serve to keep alive the interest in the list, and denote its successful operation.

DISPENSING PRICE LIST,

ADOPTED BY THE MANCHESTER CHEMISTS' AND DRUGGISTS' ASSOCIATION,

At a Special Meeting held Friday, March 19, 1869.

*Pills.**		*Powders.*	*Mixtures.†*				*Lotions, Gargles, and Injections.*	*Liniments.*
			Doses.	One oz.	Half oz.	1 or 2 drms.		
1	6d. to 1/-	6d. to 1/-	1 oz		1/-	1/-	1/-	1/-
2			1½ „		1/-	1/-		
4			2 „	1/-	1/-	1/2		1/4
6			3 „	1/-	1/4	1/6		1/8
8	8d.	1/4	4 „	1/2	1/4	1/6	1/2	2/2
10	10d.	1/6 Specially mixed, 2/-	6 „	1/6	1/9	2/-	1/4	2/8
12	1/-		8 „	1/8	2/-	2/6	1/6	3/6
14	1/2		10 „	2/-	2/6		2/-	
16	1/4	Powders for	12 „	2/6	3/-			
18	1/6	Effervescing	16 „	3/-	3/6		2/3	
20		Mixtures, 1/doz.	20 „	3/6	4/-			Lin.— oz.
24		——						Aconiti 1/-
		Lotion Powders.						Belladonnæ 1/- Chloroformi 1/-
30	1/9	One, 6d. to 1/-						Crotonis 1/-
36	2/-	Six, 2/-						Potassi Iodidi
48	2/6	Twelve, 3/6						cum Sapone, 8d.
72	4/-	3/- doz. for more						Sinapis Co. 1/6

Drops.			*Ointments and Electuaries.*	*Draughts.*		*Suppositories, Pessaries, and Bougies.*		
¼ oz.	1/-	Stoppered Bottles extra.	1/-	1	1/-	1	1/-	*Price Mark.* MEL BORACIS. 1 2 3 4 5 6 7 8 9 10 To be used thus: "M/C," 1/8, under the stamp of the First Dispenser.
½ „				2	1/-	2		
1 „				3	2/6	3	1/6	
1½ „	1/6		1/6	4	3/-	4		
2 „	1/9			5	3/4	5	2/-	
3 „	2/6		2/3	6	4/-	6		
4 „	3/-		3/-			12	4/-	

* Scale of Prices for Pills.—The higher charge to be made when one, two, or more Pills are ordered alone; if with Mixture, &c, in the same prescription, the lower charge to be made.

† Mixtures, &c —Quinine or other costly ingredients, or an extra large quantity of tincture, to be subject to a higher charge.

The uniform adoption of the Price Mark will prove advantageous in such cases, as showing to subsequent Dispensers the charge already made.

FIFTH MONTHLY MEETING, APRIL 2.

The fifth and last monthly meeting of the session was held at Union Chambers, on Friday, April 2nd, Mr. W. S. Brown, Vice-President, in the chair.

The Chairman, in opening the meeting, briefly remarked on the success which had attended the Association during this its first session; he then expressed a hope that when the full scheme of education for pharmaceutical chemists now in process of arrangement in connection with Owen's College was completed, the advantages afforded to young men would be such as to enable them to prepare for and pass the examinations without the necessity of a residence in London. He then announced that the first annual social meeting of the Association would be held at Memorial Hall, Albert-square, on Tuesday evening, April 20th, coffee at 6 p.m. Gentlemen having objects of interest which they were willing to lend for the occasion would oblige by communicating with him or Mr. Benger before that date.

He then called on Mr. Slugg, F.R.A.S., to deliver his lecture on "Spectrum Analysis."

Mr. Slugg said it was impossible to do full justice to the subject without touching upon three different branches of science; for whilst the science of Optics was the foundation on which Spectrum Analysis was built, a person could not now go through a full course of chemistry without dipping a little into astronomy; neither can he now be fully posted in astronomy without some knowledge of chemical elements. Spectrum Analysis was developed by the laws of optics, and demanded a study of both astronomy and chemistry. He would first of all devote some time to the spectrum itself, and afterwards to its power of analysis. In other words, he would first consider the analysis of the spectrum, and then analysis by means of the spectrum; assured that his hearers would find very much to interest them as druggists in the first part of the subject as well as the second. Perhaps more than anything else, the subject in hand pointed out the intellectual activity of the present day, and the rapid strides with which science is marching on, adding fact to fact, and marvel to marvel. There is a romance of science as well as of sentiment, and if the young men of our day wanted excitement, they could become the subjects of a healthy and rational excitement, if, instead of reading trashy novels, and attending disgusting exhibitions, they would make themselves acquainted with the marvellous discoveries of science, and with such facts as he was about to bring under review. The lecturer incidentally alluding to the fact that light travels at the rate of 180 000 miles in a second, by means of a diagram explained how the fact was discovered by Körner. To know how the spectrum is produced, we must first of all understand the simple yet grand law of the refraction of light; a law but for the existence of which the lecturer would have been unable to read his notes; for not only does it enable those who have passed the middle of life to read and write by the aid of spectacles, but it has, by the aid of the telescope, enabled the astronomer to scan the heavens and pierce the unfathomable regions of space, and also has enabled the naturalist to witness forms of life so infinitely small that we could never otherwise have imagined their existence. Having, by the aid of diagrams, explained the law of refraction, and in particular as applied to the prism, the lecturer pointed out that, if we shut the light out of a room by means of a shutter—except a few rays admitted through a hole in it—and then pass these rays through a prism, letting them fall into a white screen, we shall have spread out before us a band of coloured light known as the solar spectrum, a copy of the colours of the rainbow. We shall have red, orange, yellow, green, blue, indigo, and violet. Here we have a difference in the colour of the rays thus spread out, can we detect any difference in the condition of the rays? We can. There is an analogy between sound and sight. All space is filled with a substance called ether. As sound is produced by vibrations of the air, so light is produced by vibrations or undulations of this ether. When the note *A* is sounded on a violin, the string causes the air to vibrate 420 times in a second; but when a red ray enters the eye, it pulsates on the retina 477,000,000,000,000 times in a second, and the extreme violet ray 727,000,000,000,000 times, the intermediate colours pulsating proportionately according to their order. Hence we see that difference in colour is produced by difference in the length of the wave, the length of each varying from $\frac{1}{38000}$th to $\frac{1}{60000}$th of an inch. The general belief is that light and warmth are inseparably connected together; that the more light there is the more warmth there will be, and the more heat, the more light. Is it so? They are not. Not only are light and heat the result of sunshine, but we find from experience that there is another principle at work where there is sunshine. If a draper expose delicately-coloured ribbons, etc., in his window for several days, he soon discovers that the colours are being destroyed; so, also, if a druggist expose dark-coloured castor oil to the light, it will become bleached; or if a piece of paper covered with a solution of chloride of silver, which is white, be exposed in one part to the action of a sunbeam, whilst the other is protected from it, it will be found that the exposed part has turned black, and the other not, proving that there is another agency at work besides light and heat, viz., chemical power, or actinism. It is found that the red rays are those which produce heat, the yellow those which give light, and the blue those which possess chemical action. If we place the most sensitive photographic preparations in a room lighted with yellow glass windows, they will remain for any length of time unchanged. But if it be lighted with cobalt blue glass, so dark as to obstruct the light, these salts will undergo rapid change. *Hence we see the folly which so extensively prevails of putting prussic acid, and many other chemicals which are easily acted on by the actinic ray, into blue glass bottles*, in order to preserve them. After naming many proofs substantiating the view he had given, Mr. Slugg passed on to the elucidation of analysis by means of the spectrum. By the aid of some excellent diagrams, the subject was made very clear. He pointed out that though it was impossible to conceive of anything more delicate than the test afforded by the spectrum of the presence of many chemical substances, yet it did not reveal the quantity that might be present. Applied to the sun, it had been discovered that hydrogen, nitrogen, sodium, magnesium, barium, iron, antimony, bismuth, tellurium, and mercury, formed some of its constituents. The spectroscope had been applied to the fixed stars, to meteors, to comets, and even to lightning, and had been the means of revealing many strange facts, and of showing that many of the same substances found upon the earth were scattered throughout the universe. The results of the application of the spectroscope to the late solar eclipse, and Mr. Huggin's wonderful discovery by its means that Sirius was moving away from the earth at the rate of 1,000,000,000 miles a-year, were clearly explained. Mr. Slugg concluded by some remarks on the intellect of man, and the capacity of the human mind to discover and grasp such marvellous truths as those he brought before the meeting. A cordial vote of thanks to Mr. Slugg for his lecture, proposed by Mr. Benger, and seconded by Mr. Bateman, was carried with acclamation.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The last monthly meeting of this Association was held on Friday evening, in the Exchange, when there was a large attendance of members. The chair was taken by Mr. Atherton. The minutes of the last meeting having been read and confirmed, the presentation of a cabinet of *materia medica* by Messrs. Evans, of London and Liverpool, was notified. Mr. Lewis, in appropriate terms, moved a vote of thanks to Messrs. Evans for their valuable present, which included ingredients seldom used in the trade, but a thorough knowledge of which was necessary before members would be able to pass an examination, and go into business on their own account. The motion was seconded by Mr. Parker, and carried *nem. con.* The chairman then announced that Mr. Evans, a vice-president of the Pharmaceutical Society, and chairman of the Board of Examiners, would deliver a lecture on "Pharmaceutical Education." Mr. Evans, who met with a cordial reception, said when they were kind enough to invite him to come before them and speak upon pharmaceutical education, he felt it was his bounden duty to accept their invitation, and he did so with pleasure. As long as he had been connected with the profession, he had taken deep interest in pharmaceutical education, and especially in new associations like the present, the members of which had by their own efforts established themselves for the purpose of improving their position. At the present time the necessity for such associations was very great. He need hardly refer to the passing of the Pharmacy Act, and to its provisions, which rendered it compulsory on all future aspirants to pharmaceutical positions to undergo an amount of education, and to be tested therein. How can intelligent pharmaceutists, he continued, pass by with a careless superficial glance the study of vegetable organization, when so large a proportion, and those of the greatest medicinal value, is derived from the vegetable kingdom? There are some, no doubt, content to circumscribe the region of their knowledge by a simple acquaintance with the names of drugs, and the ordinary uses to which they are applied; men, in fact, who have no ambition to rise above the pestle and mortar; to such any appeal I might make would fall to the ground—would fall dead and irresponsive upon their dull intellects. I would, however, urge upon such, if any be here present, that the age is not stagnant of thought or energy; and if any here is contenting or consoling his idle propensities in the belief that he will be able to jog on as did his forefathers, he is much mistaken, and, when too late, will find it so to his cost. He will find he has let go the golden (in every sense) opportunity, by obeying now the voice of sensuous indolence; for, however much he may accuse his lack of opportunities, and so excuse himself, indolence and the unbridled love of pleasure, in most cases, are the secret tyrants which shackle him. When hereafter he finds himself surrounded by the activities of actual business, he will find it too late to correct the error of his youth, and will be constrained to give way to his more accomplished neighbours and competitors. The study of botany lays a foundation for, and greatly facilitates the acquirement of knowledge, but beyond this, it pre-eminently concerns the everyday duties of the pharmaceutist, and in a great many ways practically influences his experience, and the more readily fits him to earn and merit the respect, confidence, and support of the public and medical profession. Apart, again, from the simple business aspect of the question, the knowledge acquired by the study is always becoming available and useful, rendering the possessor a more serviceable member of society, and consequently elevating his social status. It fosters also an ambition for the acquirement of general knowledge; it fits him to associate in thought, if not in person, with those bright geniuses who have gone forth to pioneer the untrodden forest, and open out its riches and untold wealth. It enables him to sympathise with the enjoyments of all mankind in every region of the globe, while expanding his own resources for pleasure and profit. The meeting terminated with a hearty vote of thanks to Mr. Evans for his able address, which was listened to with profound interest, and was warmly and frequently applauded.

NOTTINGHAM CHEMISTS' ASSOCIATION.

The annual dinner of the Nottingham West-end Chemists' Association was held on the 1st inst., at the Queen's Hotel, Alfreton-road, under the presidency of Mr. J. Wilcockson. The usual loyal and patriotic toasts were proposed, drank, and duly responded to, and the evening was spent in a very agreeable manner.

TESTIMONIAL TO MR. JOHN MACKAY.

At a meeting of a few members of the Pharmaceutical Society recently held in Edinburgh, it was suggested by Mr. H. C. Baildon that the time had arrived when it was desirable to present Mr. John Mackay with a fitting testimonial for his long and arduous services, gratuitously rendered to the Society for twenty-eight years as honorary secretary for Scotland. The following members of the Council were present, viz., Mr. W. Aitken, Mr. H. C. Baildon, Mr. G. Blanshard, Mr. D. R. Brown, Mr. D. Kemp, and Mr. J. R. Young, who expressed their cordial concurrence in the proposal. Mr. H. C. Baildon was requested to act as honorary treasurer, and Mr. W. Ainslie as honorary secretary. The sums below have already been subscribed:—

Mr. W. Aitken, Edinburgh	£2	2	0
Mr. James Aitken, ditto	0	10	6
Mr. W. Allan, Dumfries	0	10	6
Mr. Wm. Anderson, Edinburgh	0	10	6
Mr. Anderson, Musselburgh	0	5	0
Professor Archer	1	1	0
Professor Attfield, London	2	2	0
Mr. H. C. Baildon, Edinburgh	2	2	0
Mr. Wm. Baildon, do.	0	10	6
Messrs. John Bell & Co., London	2	2	0
Professor Bentley, do.	1	1	0
Mr. Bourdas, do.	2	2	0
Mr. H. B. Brady, Newcastle	2	2	0
Mr. E. Bremridge, London	1	1	0
Mr. R. S. Brown, Edinburgh	0	10	6
Mr. Thomas Brown, do.	1	1	0
Mr. William Brown, Dunfermline	1	1	0
Mr. G. Burrell, Montrose	0	10	6
Mr. J. Cameron, Edinburgh	0	10	6
Mr. W. Cameron, Kelso	1	1	0
Messrs. Clingan and Mortimer, Edinburgh	2	2	0
Mr. Charles Cumming, do.	2	2	0
Mr. J. Davidson, Elgin	2	2	0
Davidson & Co., Aberdeen	1	1	0
Messrs. Duncan, Flockhart, & Co., Edinburgh	10	10	0
Mr. William Duncanson, Stirling	1	0	0
Messrs. Dunn & Co., London	2	2	0
Mr. B. Ellis, Banff	1	1	0
Mr. H. S. Evans, London	2	2	0
Mr. D. Ewart, Leith	0	10	6
Mr. Thos. Fairgrieve, Edinburgh	2	2	0
Mr. Thos. Finlayson, Leith	1	1	0
Mr. Wm. Flux, London	1	1	0
Messrs. Gardner & Ainslie, Edinburgh	4	4	0
Mr. J. Gurle, Bromley	1	1	0
Mr. W. Gilmour, do.	1	1	0
Mr. A. F. Gray, do.	0	10	6
Mr. F. Greig, Dunbar	1	0	0
Mr. John Guthrie, Edinburgh	0	10	6
Mr. James Harley, do.	0	10	6
Mr. T. B. Hearder, do.	0	10	6
Mr. H. Henry, Macduff	0	5	0
Mr. James Heron, Edinburgh	1	1	0
Mr. Hills, London	2	2	0
Mr. John Hutchinson, Edinburgh	1	1	0
Mr. W. G. Hill, do.	0	10	6
Mr. J. G. Iverach, Kirkwall	0	10	6

Mr. W. Iverach, Wideford	£0	10	6
Mr. Kemp, Portobello	2	2	0
Mr. A. Kennedy, Edinburgh	1	1	0
Mr. Charles Kerr, Dundee	1	0	0
Mr. Walter Laidlaw, Edinburgh	0	10	6
Mr. Robert Lees, do.	1	1	0
Mr. William Leitch, do.	1	1	0
Mr. D. M. Mackay, Aberdeen	0	10	6
Mr. A. Mackintosh, Rothesay	0	10	6
Professor Maclagan, Edinburgh	1	1	0
Mr. W. F. Marshall, do.	1	1	0
Messrs. Meggeson & Co., London	2	2	0
Mr. Meggeson, do.	1	0	0
Messrs. Mitchell & Fraser, Inverness	1	1	0
Mr. Morson, London	2	2	0
Mr. Munro, Inverurie	0	5	0
Mr. Murdoch, Falkirk	1	1	0
Dr. Stevenson Macadam, Edinburgh	2	2	0
Mr. T. T. M'Culloch, do.	0	10	6
Mr. J. Macdonald, Lasswade	0	10	0
Messrs. Macfarfaue & Co., Edinburgh	5	5	0
Mr. J. Y. Macfarlan, do.	0	10	6
Mr. James Mackenzie, do.	1	1	0
Mr. Alexander Napier, do.	1	1	0
Mr. W. R. Niven, do.	0	10	0
Mr. Alexander Noble, do.	2	2	0
Mr. J. F. Peters, Jedburgh	1	0	0
Mr. J. Prentice, Edinburgh	0	10	6
Messrs. Raimes, Blanshards, & Co.	5	5	0
Dr. Redwood, London	1	1	0
Mr. N. Reid, Perth	0	10	6
Mr. T. Kerr Renwick, Edinburgh	2	2	0
Mr. James Robertson, do.	2	2	0
Mr. G. W. Sandford, London	2	2	0
Mr. Thomas Scott, do.	2	2	0
Mr. A. Seath, Dunfermline	1	1	0
Messrs T. & H. Smith & Co., Edinburgh	5	5	0
Mr. Alfred Spence, York	2	2	0
Mr. D. Steel, Edinburgh	0	10	0
Mr. Gavin Steel, Dunfermline	1	1	0
Mr. E. Stanford Glasgow	1	1	0
Mr. J. B. Stephenson, Edinburgh	1	1	0
Mr. D. Storrar, Kirkcaldy	1	1	0
Mr James Veitch, Dunse	0	5	0
Mr. Waugh, London	2	2	0
Mr. J. Williams, do.	1	1	0
Mr. Wilson, Perth	0	10	0
Mr. J. Wilson, Leith	1	1	0
Mr. James Wilson, Edinburgh	0	10	6
Dr. Young, Edinburgh	1	1	0

No complete list of members of the Pharmaceutical Society and of chemists and druggists having been made up to the present time, the secretary to the fund requests that any member who has not yet received a circular will be good enough to communicate with him, and one will be immediately sent; or a subscription towards the fund may be remitted either to the secretary or to the treasurer, who will, with the receipt, enclose a circular.

Any members who have, from inadvertence, not been waited on in Edinburgh or Glasgow, will please to send their subscriptions to either of the undersigned.

William Ainslie, Hon. Secretary, Edinburgh.
Henry C. Baildon, Hon. Treasurer, Edinburgh.

BANKRUPTCY.

IN RE H. HUBBARD, LEICESTER, DRYSALTER.

The first meeting in this matter was held at Nottingham on the 22nd ult. Mr. Stevenson, of Leicester, appeared for creditors, and on his nomination, Mr. Hunt and Mr. Church, both wholesale confectioners, of Leicester, were appointed assignees. The meetings for last examination and discharge fixed for April 27.

IN RE SAMUEL BOOTH, CHEMIST AND DRUGGIST, THAME.

An adjourned examination, sitting, and application for order of discharge, took place before Mr. Commissioner Bacon. Liabilities, £705 13s. 2d. Meeting adjourned until 23rd inst., with renewed protection.

LAW AND POLICE.

SENDING VITRIOL FOR SHIPMENT.

At the Liverpool Police Court, on the 19th ult., Messrs. William Hill and Son, drysalters and vitriol manufacturers, of Vauxhall-road, Liverpool, were summoned with having caused to be sent to the Clarence Dock, on the 15th March, certain goods of a dangerous quality, viz., 15 carboys, containing oil of vitriol, and having neglected to distinctly mark or state the nature of the goods on the outside of the carboys, whereby a penalty not exceeding £20 had been incurred. Evidence as to the 15 carboys of vitriol being laid down for shipment on the west side of the Clarence Dock quay having been adduced, his Worship (Mr. Rolfe) imposed a penalty of 40s. and costs.

ACTION FOR THE LOSS OF OIL.

At the Stoke-upon-Trent County Court, on the 5th inst., an action was brought by Mr. Henry Mollineux, druggist, Hyde, Lancashire, against the North Staffordshire Railway Company, for the value of a cask of oil. In November last plaintiff ordered two casks of oil from Messrs. Hardman, Jones, and Co., of Milton Oilworks, near Ford Green railway station. The oil was for machine purposes, and was of about the consistency of treacle. When the casks arrived at Macclesfield it was discovered that the contents of one of them—11 cwt. 0 qrs. 21 lbs., value £1 14s. 3d.—was spilt on the railway. Defendants pleaded that the oil had been put into a bad cask, and being improperly bunged, the contents of the cask was lost before any shunting took place, and therefore no blame was attached to the railway company. Judgment was given for defendants.

At the Warwickshire Sessions, on the 7th inst., George Lee was sentenced to twelve months' imprisonment for having attempted to obtain certain medicines and money, the property of Mr. Frederick John Webb, chemist, Leamington, by tendering in payment of the articles a note of a Burslem Bank that had ceased to exist thirty years back.

A girl named Elizabeth Jones has been committed for trial at Liverpool for attempting to poison her mother, by giving her a mixture of gin and "Crew's Disinfecting Fluid."

At the Banbury Divisional Petty Sessions, on the 11th ult., John Colegrove, chemist's assistant, was charged with drowning a dog in the Oxford Canal, by which he had incurred a penalty of £5. He was discharged on paying the costs incurred, 13s.

ACCIDENTS.

DEATH FROM CHLOROFORM.

Mr. William Godley, chemist, of Mitchell-street, Sheffield, has recently died from the operation of chloroform preparatory to the performance of a surgical operation. It appeared that deceased had for some years suffered from a diseased bone in the leg, and he had consented to have a surgical operation performed by Mr. Marriott Hall and Mr. Parker, surgeons. The chloroform was administered on two narrow strips of cambric handkerchief, and according to the form laid down by Dr. Drewitt in his "Surgeons' Vade Mecum." Deceased inhaled it for about three minutes, and then fell upon the bed dead from syncope. The action of the chloroform is attributed to fright. An inquest was held on the body of the deceased. Mr. Hall, who administered the chloroform, stated that the deceased could have stood the operation without chloroform, but he distinctly stated that it was his particular wish that they should use chloroform, and, as there was nothing to prevent it, it was administered. Deceased spoke rationally several times after the chloroform was administered for perhaps a minute, and then gradually became a little drowsy, till he rose up all at once, struggled, and then dropped down dead. Mrs. Eliza Godley, mother of deceased, stated that the chloroform was carefully administered, and she did not attribute blame to anyone. The jury returned a verdict "that the deceased, Mr. Godley, died from paralysis of the heart during the operation of chloroform, preparatory to the performance of a surgical operation."

A sad accident occurred on the 29th ult. at Foston Hall, near Derby, whereby Mr. Joseph West, chemical manufacturer, of Derby, lost his life. Several gentlemen had left Mr. Meynell Ingram's hunt, and were galloping over the grass land in front of the Hall, when Mr. West's hunter became restive, and ran away. In its course the animal went under a tree, and Mr. West, striking his head against a thick branch, was instantly killed.

GOSSIP.

At the Deddington Sessions, a license was granted to Mr. W. M. Carr, chemist, to sell benzoline, the stock not to exceed 20 gallons.

At the Wellingborough Petty Sessions, on the 12th ult., licenses to sell petroleum were granted to Mr. Sargeaunt and Mr. Simco, chemists.

The directors of the Staffordshire Railway Company are prepared to receive tenders for the supply of the following articles for twelve months :—Varnish, colours, oils, drysaltery. April 24.

At the West Riding Sessions, on the 5th inst., Mr. William Baker, chemist, of Sheffield, was appointed analyst of articles of food and drink purchased within the district or division of Upper Strafforth and Tickhill, including the borough of Sheffield.

At the Wednesbury Petty Sessions, on the 30th ult., the first application for a license under the Petroleum Act was made by Mr. Edward Harvey, of Market-place. The form of license was under the Form C, and will allow of one gallon being kept in a shop, and 100 gallons in a warehouse.

Trade Memoranda.

THE removal of the tea licenses will give a turn long deserved to a class of firms who have been sufferers every time the duty has been lightened. We refer to the wholesale houses who supply packet teas. Each reduction meant for them a considerable loss, as an unreasoning but quick-witted public of course looked for the full benefit immediately; and manifestly these dealers had no opportunity, even if they had had the wish, of varying the quality of their goods then in the market. The present step will no doubt greatly facilitate the appointment of agencies, and we look for packet tea to justify Mr. Lowe's anticipation of elasticity in the trade.

The Fifteenth Annual Report of the Briton Medical and General Life Association, presented to a meeting held on the 19th ult., exhibited the following results:—The new premiums for the year reached the sum of £25,277, which, added to renewals, interest on investment, and other items, brought the gross income of the Company up to £237,980. The claims paid and in course of payment amounted to £127,886, and the total assets in hand (including £104,058 funded securities, £225,737 mortgages, £177,538 loans and other investments) were represented by the sum of £667,493.

The fourth ordinary general meeting of Liebig's Extract of Meat Company (Limited) will be held at the London Tavern on May 3. The transfer books will be closed from May 1 to May 3 next.

The publication of the Official Register of Chemists and Druggists is, we understand, still delayed. The printers are, as usual, the criminals. It will not be ready before the middle of May, and we should prefer to risk our veracity on a month later. We learn that Messrs. Kelly and Co. have also turned their attention to the drug trade, and are preparing a Directory of all persons in the United Kingdom connected with the business. Numerous correspondents will kindly accept this as an answer to their inquiries.

Messrs. Jeremiah Curtis and Sons make an announcement in our advertising pages respecting the supply of Mrs. Winslow's Almanack for 1870. Our readers will doubtless notice it, and accept the offer thus made to them.

Messrs. D. Judson and Son have lately removed from Coleman-street to Southwark-street, which, for large business, has within the past few years become a worthy parallel on the other side of the river to Cannon-street on this.

Several improvements have been made in the Petroleum Oil-tester manufactured by Mr. Miles, which we described last month. By comparing our sketch with the one which will be found in another part of this journal, these improvements will be evident. The superintendents of the Board of Works, as well as such firms as Young's Paraffin Light Co., have expressed their approval of this apparatus, which for its purpose seems to us to answer perfectly.

GAZETTE.

BANKRUPTS.

Brooker, J. B., late of Portsea, chemist.
Conry, T., Long Eason, Derbyshire, medical practitioner.
Digby, Frederick, Cheltenham, surgeon.
Hollis, W., Stoke-upon-Trent, chemist.
McDowell, D., South Shields, druggist.
Rogers, W. H., East Stonehouse, Devonshire, chemist.
Symons, J. B., Westbourne-grove, Paddington, surgeon.

BANKRUPTCY ANNULLED.

Brown, Sidney, Blackfriars-road, perfumer.

PARTNERSHIPS DISSOLVED.

Corbett, W., and Millward, C., jun., Bradford, manufacturing chemists.
Cowgill, B. B., Cowgill, A., and Cowgill, S. O., Halifax, wholesale druggists and general dealers; so far as regards B. B. Cowgill.
Lowe, G., and Martin, E. N., Burton-on-Trent, surgeons.
Pidduck, J., and Swann, C., Bridge-terrace, Harrow-road, Paddington, chemists.
Smith, G. N., and Pickett, J., Wolverhampton, surgeons.
Stevenson and Parsons, Nottingham, surgeons.
Whicher, J., and Cross, R. S., Petersfield, surgeons.
Whitten, J., and Jones, J. L., Liverpool, chemists and druggists.

Notes and Queries

Y. Z.—We cannot give you the form you ask for, though we believe the preparation you refer to is an animal oil, highly purified and exquisitely scented.

D. J.—The War Office is the proper place to apply for such information as you require. The Pharmaceutical Examinations were fixed as the standard some years ago, but pharmaceutical chemists aimed at higher game, and we believe army dispensing is now frequently the occupation of sergeants, whose boldness probably exceeds their skill in this department. (2.) The wholesale house was quite correct. Single copies of this journal are invariably charged a shilling.

A. H. (Edinburgh).—The price of Hager's "Conspectus" is 7s. The Pharmacopœia of the Hospital for Diseases of the Chest is a cheap work.

A. M. (Liverpool).—Squire's "Companion" has been prepared in accordance with the present Pharmacopœia. Price 10s. 6d. Publisher, Churchill.

S. R. A. (Salisbury).—We regret that we cannot reprint the correspondence.

Correspondence

OUR FUTURE APPRENTICES AND ASSISTANTS.

TO THE EDITOR OF THE CHEMIST AND DRUGGIST.

Sir,—The flattering tale that hope is continually relating of the bright future that is in store for the rising generation of pharmacists, has led me into a meditation as to whether these delightful visions are likely to be realized.

We are told that the future of pharmacy is to be of a higher standing, more professional in its character, that there is to be a higher rate of remuneration for its services, and that a higher class of persons must be trained for its practice; and as a corollary to all this we are to expect more restriction and exclusive regulations. None are to practise our honourable and lucrative calling but such as shall have passed the examinations of the Pharmaceutical Society. This barrier to the pharmaceutical brotherhood at once bars the entrance to all that class of improper persons whose education has fallen short of what may be termed the required amount, and whose fortunes are too small for them to acquire more. It also bars a still more numerous class, who, not having received any preliminary training in the knowledge requisite for the examination, will probably quit the trade altogether, rather than spend the time and incur the expense of acquiring that for which they have neither taste nor genius. They can do as well in other businesses, and therefore they will quit that one that appears not to want them. Many of both these classes have been hitherto useful men in the trade, occupying positions and fulfilling duties that men of higher attainment would not undertake. Can the trade do without these? Let those answer who have employed them. Many of these men made the best assistants, far more useful and confidential than their more pretentious brothers. But alas! we are to have no more of them, and the question now is, who is to supply their place? We are told by a writer in the *Pharmaceutical Journal* that "the institution of apprenticeship must be remodelled," that "the term of apprenticeship should not exceed three years, and the services of the apprentice reckoned as of no value." It is said there is but a step from the sublime to the ridiculous, and this writer has certainly taken it. Who would be bothered with apprentices on such terms? And suppose anybody weak enough to take them? What would they be worth as men of business when they had finished their training, for it could not be called anything else? Such a youth would merely be a young gentleman, who had been receiving a scientific education under the most favourable circumstances. He would, of course, have to pay a handsome premium for such genteel and tender handling, and great care would be taken lest he injure his health by doing nasty work in the shop or in the warehouse. After this brief pupilage in the "pharmacy," he is to travel to Bloomsbury-square, and complete his curriculum. Let me ask all sober-minded men whether a youth, having gone through such a training, is at all likely to meet the requirements of the trade or *the necessity of the public.* His attainments as a man of science might be of the highest character, and his natural ability of the very best; but it would be a matter of surprise to men if both he and his friends did not bitterly regret the process by which he was made a pharmaceutical chemist. Now this is the point to which I am anxious to draw the attention of the more sober portion of the trade. Is such pernicious sentiment to be allowed to prevail through the trade, and in the councils of the Parmaceutical Society? If it is, we may expect in the course of five or six years there will be neither apprentices nor assistants to be got; our business will be diverted into other channels; we shall be left in the noble and majestic position of *qualified dispensers of poisons.* But if we wish to preserve the trade from such dilettanteism, let every member arouse himself, and do all he can to return men of common sense and business habits as members of the council of the Pharmaceutical Society. The members of the trade have hitherto been indifferent about this, but let them be so no longer. All power has been given to this body, and it has become our imperative duty now to watch that the power be not abused. Let us have no more legislative shackles twisted round our wrists.

Bradford, March 30th. F. M. Rimmington.

SHARP PRACTICE.

TO THE EDITOR OF THE CHEMIST AND DRUGGIST.

Sir,—As the following may be useful to the trade, as showing how careful one ought to be in opening accounts with strangers, I trust you will give it a place in your journal.

In November last I was called upon by a traveller representing a firm of truss-makers in Hull, and after repeatedly declining to order anything of him, he persisted in booking some trusses, which he said he would take back again on the next journey if I had not sold them. However, not he, but another individual called on me on the next journey and on his presenting the account, I told him on what terms (sale or return) the trusses had been sent, when he commenced to bully at a great rate, and, in effect, made me out a liar, rushing out of the shop threatening the law, and doing all this with the air of one who was quite accustomed to doing his business in this style, and without giving me a chance of replying, had I felt so disposed with such a person. In due course I got the threatened summons, and wrote to the firm about it, when I received the following reply, of which I give you a literal copy:—

"Sir,—I have just returned home & find your letter the Travellor indignanly States he never sold the goods on sale or return the fact of your having a copy of our Conditions of sale on our catologe is a condraction & our Sollicter thinks we may safely incur the expense of Self & Witness which of course you will have to pay & will be a good Sum we are sorry we cannot make a precident havg never sent a Shillings worth of goods to any one on sale or return of course you are aware if you do not know you can enquire that we must have three days notice of your paying into court as if we come we shall apply to the judge for our expencs I mention this as in one Case the Party though to Pay in the day before & saddle us with the Expens but he found his mistake."

(Copy kept.)

After such a letter, Sir, I think you will be of opinion with me that there was nothing to do but pay the money and be done with it, for between the indignant traveller (with such a bad memory as he evidently has) and "our Sollicter," I fear I should have had a sorry chance even in an English court of justice, where I could only give my unsupported word of truth in the matter. The name of "our Sollicter" does not transpire. Do you happen to know whether Dodson & Fogg practice in Hull? or is it possible that "Mr. Veller's" friend "learned in the law" may reside there?

Yours truly,
E. B. S.

South Shields, April 13, 1869.

WHOLESALE ASSISTANTS.

TO THE EDITOR OF THE CHEMIST AND DRUGGIST.

Sir,—I understand that a movement is being made to petition Parliament respecting wholesale assistants, viz., to allow such to pass the modified examination. Now, Sir, I consider that such a thing would be most unjust, for surely any porter, with a slight smattering of the business, will be able soon to style himself "Chemist by Examination," while I (and many others who have served an apprenticeship of five years, paid a heavy premium, spent both money and time, are compelled to pass two examinations, the fees of which are £5 5s., whereas any wholesale porter who has swept a warehouse for three years could, at the expense of a guinea and a little cramming, claim precisely the same privileges. Not that I am the least jealous of those qualified to pass the modified, but still I think a higher standing should be given to all who have spent so much more money and time to gain the necessary certificate. Much rubbish falls through a large sieve, and I think the old motto "honour to whom honour is due" should not be forgotten.

I remain, Sir, yours respectfully,
A Registered Student of the
Phamaceutical Society.

Varia.

COD-LIVER OIL.

On the bleak shore of Norway, I've lately been told,
Large numbers of cod-fish are found,
And the animals' livers are afterwards sold
At so many "pfennigs" per pound;
From which is extracted, with infinite toil,
A villainous fluid called cod-liver oil.

Now, I don't mind a powder, a pill, or a draught—
Though I mingle the former with jam,—
And many's the mixture I've cheerfully quaff'd,
And the pill I have gulp'd like a lamb.
But then I envelop my pills in tin-foil,
And I can't do the same with my cod-liver oil!

In the course of my lifetime I've swallowed enough
To have floated a ship of the line,
And it's purely the fault of this horrible stuff
That I've ceased to enjoy ginger wine.
For how can you wonder to see me recoil
From a liquor I mix'd with my cod-liver oil?

There are few deeds of daring from which I should quail—
There are few things I'd tremble to do;
But there's one kind of tonic that makes me turn pale,
And quite spoils my appetite, too:
But you see, just at present, I've got none to spoil,
So I don't mind alluding to cod-liver oil!

Carols of Cockayne, by Henry S. Leigh.

TRADE REPORT.

The commercial world has not been wanting in sensational events during the past fortnight. On the 1st of April the directors of the Bank of England raised their rate of discount by 1 per cent., and though at the time unlooked for, this step does not appear to have been at all unjustifiable, and we believe it may be accepted to some degree as a sign that money is now finding profitable employment in legitimate speculation. But a far more startling announcement awaited us in the annual statement of the Chancellor of the Exchequer. More than two years of depression, including a panic of extraordinary violence, had produced the not unreasonable result of a revenue unequal to the estimates. In addition to this, our Ethiopian excursion had cost us nearly five millions more than we had allowed for. Rich men had perversely refused to die, and thus swell the treasury with legacy duty; and all we asked from Mr. Lowe, or rather all we looked for, was some share of epigram and eloquence to coat the pill we had to swallow, or, if we may so express it, a decent funeral oration over our dead past extravagance, and a resolution which has now become something more than a sentiment with the whole nation—to live, fight, or govern more economically for the future. But we had reckoned without our host. Mr. Lowe's genius was not to be hampered by a few millions deficit; and, apart from all political partisanship, all may join in congratulating the Chancellor on the brilliant stroke of financial statesmanship by which he has signalised his first year of carrying the bag. It is not simply that he has devised a plan by which he has been able, in spite of serious difficulties, to remit the taxation in half-a-dozen different directions—in fact, to suspend it altogether for some nine months, and, as a result, to give us fair promise of a surplus next year—but he has inaugurated a financial policy, which, we are convinced, future years will prove to be productive of a vast increase in the health and soundness of the commercial system of the country, and therefore of infinitely more importance than any price we might have to pay for it, although, so far from this, we are rather bribed to accept the change.

Few chemists will care about the removal of the duty from hair powder, and we could almost count on our fingers those who will be affected by the changes made in the duty on armorial bearings; but each and all will regard with satisfaction the reduction in income-tax and fire insurance and the abolition of the tea licences. This last will please especially those druggists who, selling neither tea nor coffee, have hitherto been compelled to pay 11s. 6½d. a year to sell a few ounces of pepper. The removal of the last impost on grain affects us slightly, but we shall only remark on this, that scarcely one per cent. of our population were aware of the existence of any such duty, and we cannot doubt that the removal of this last restriction on the imports of corn will, to a great extent, realize Mr. Lowe's expectation that our ports will become more than ever granaries for the world, and thus add a great stimulus to our commerce. All these considerations make us hopeful, and the buoyancy which this remarkable budget has produced in the highest circles of business will doubtless extend to, and benefit in some degree, every market in the kingdom.

CHEMICALS.

Mr. Caudery has favoured us with the following report of the chemical markets for the month ending April 13th, 1869:—

During the whole of the month prices for most articles had a downward tendency, business generally being quiet.

Soda.—Crystals were quoted throughout at £4 2s. 6d. ex ship, but it was with difficulty that this could be realized; in fact, the total business done was but small. Ash experienced somewhat more demand, and the general quotation was 1$\frac{15}{16}$d. landed. Bicarbonate still remained very quiet at 10s. 9d. landed. For Caustic the inquiry somewhat slackened, and price fell to 14s. 9d. landed, for best white 60 to 62 per cent.

Bleaching Powder dull at 10s. 6d. to 10s. 9d. landed.

Acids.—In Tartaric a reaction set in, and makers reduced their price to 1s. 2¾d. for crystals, but till the last week of the month second-hand parcels were freely offering at 1s. 2½d. These seem now, however, to be all bought up, and the market closes with a much firmer appearance at 1s. 2¾d. to 1s. 3d. Citric met with little or no demand, and price has again fallen, as low as 2s. 7d. being accepted. In Oxalic more business was done, but prices remained at 7½d. to 7¾d.

Cream of Tartar gradually advanced to 90s., with a good business done at the intermediate prices.

Sulphate of Quinine receded, transactions taking place as low as 5s. 1d., but from this it recovered to present price of 5s. 3d. for Pelletiers. English was unaltered.

Sulphate of Copper was very dull at 24s. 9d. for first quality.

Alum.—A reduction of 5s. per ton was made from the official prices, which had ruled for upwards of three years, and this has caused an increased business to be done. The present quotations are £7 5s. to £7 10s. for lump, and £8 5s. to £8 10s, for ground.

Borax improved; 68s. present price.

Potash.—For Bichromate there has during the last fourteen days been an extensive inquiry for export, and large transactions were concluded at 5d. per lb., with discounts from 12½ to 7½ per cent. At the close, however, there are rather buyers than sellers at the latter rate.

Refined Saltpetre was dull, and gave way in price to 28s. 6d. to 29s., according to size of packages.

Sal Ammoniac.—A fair business done at the full prices now current among all manufacturers, viz., 36s. and 38s. for second and first quality.

DRUGS.

Throughout the month business has been exceedingly dull, and though there are no important variations to note, last month's prices have scarcely been maintained. At the public auctions most of the parcels were disposed of with difficulty, and large quantities were bought in or withdrawn. Socotrine Aloes is somewhat lower. A little animation has been evident in good qualities of Rhubarb, and the prices obtained have been irregular. At present Rhubarb stands at a slightly lower figure than last month. No further speculation has taken place in Opium during the month, and buyers are not anxious; a fall of 2s. is the result, and will not be unwelcome. We cannot, however, anticipate any considerable reduction in the value of this drug for some time to come, as the produce has not been equal to former seasons, and stocks are comparatively small both in London and Smyrna. Camphor is no dearer, although we last month anticipated a rise; and Castor Oil still continues easy in price. Some superior parcels of Alexandrian Senna have been sold at higher rates, other kinds remaining at their usual value. Ipecacuanha has advanced; also Gentian Root. Red Bark has kept firm, and British Quinine still commands 5s. 9d.; French has receded 1d. since our last.

DRYSALTERY, ETC.

We have reports from Bombay to hand up to Feb. 13, which are favourable respecting the new crops of Safflower and Indigo. The price of Gum Arabic is there reported as lower, though it is very firm and advancing here. Cutch is steady; Gambier in little request; Turmeric rather cheaper. Good business has been transacted in the market for Spices, etc. Sago is rather higher; Pepper of both kinds barely sustained; Cloves lower; Cinnamon and Cassia firm; Mace much higher; Nutmegs very steady.

DYES.

No change, except a further advance in Jamaica Logwood, for which a large demand has existed for several months. Floating cargoes are also readily disposed of.

OILS.

Olive has still remained very dull, and an average reduction of £1 per tun has taken place in all kinds. The present highest price is now £53, as compared with £73 in April, 1868. Linseed Oil is scarcely so firm, and lower prices have been accepted. Turpentine moved off very slowly until within the last week, when some large sales were reported, but still at moderate rates. Petroleum is firm.

Monthly Price Current.

[The prices quoted in the following list are those actually obtained in Mincing-lane for articles sold in bulk. Our Retail Subscribers must not expect to purchase at these market prices, but they may draw from them useful conclusions respecting the prices at which articles are offered by the Wholesale Firms.]

CHEMICALS.

	1869. Jan.					1868. Jan.				
ACIDS—	s.	d.	to	s.	d.	s.	d.	to	s.	d.
Acetic ....per lb.	0	4	..	0	0	0	4	..	0	0
Arsenious (*see* Arsenic)										
Citric ....per lb.	2	7½	..	0	0	1	10½	..	0	0
Nitric .... ,,	0	5	..	0	5½	0	5	..	0	5½
Oxalic .... ,,	0	8	..	0	0	0	8	..	0	0
Sulphuric ...... ,,	0	0¾	..	0	1	0	0¾	..	0	1
Tartaric crystal .. ,,	1	3	..	0	0	1	0½	..	0	0
powdered ,,	1	3¼	..	0	0	1	1¼	..	0	0
Antimony ore......per ton	280	0	..	300	0	260	0	..	280	0
crude ..per cwt	25	0	..	26	0	23	0	..	0	0
regulus.. ,,	48	0	..	49	0	45	0	..	0	0
star .... ,,	48	0	..	0	0	45	0	..	0	0
Arsenic, lump...... ,,	16	0	..	16	0	16	0	..	16	6
powder.... ,,	7	9	..	8	0	7	3	..	7	6
Brimstone, rough ..per ton	165	0	..	0	0	132	6	..	135	0
roll ....per cwt	12	0	..	0	0	10	3	..	11	0
flour.... ,,	14	0	..	14	6	14	0	..	14	6
Iodine, dry ....per oz.	0	9¾	..	0	10	0	9	..	0	9½
Ivory Black, dry..per cwt.	0	0	..	0	0	0	0	..	0	0
Magnesia, calcined..per lb.	1	6	..	1	8	1	6	..	1	8
Mercury....... per bottle	137	0	..	0	0	137	6	..	0	0
Minium, red ......per cwt.	20	9	..	21	0	21	0	..	22	0
orange .... ,,	32	6	..	33	6	33	6	..	0	0
Precipitate, red ....per lb.	2	6	..	0	0	2	6	..	0	0
white .. ,,	2	5	..	0	0	2	5	..	0	0
Prussian Blue ...... ,,	1	0	..	1	10	1	0	..	1	10
SALTS—										
Alum ....per ton	145	0	..	150	0	150	0	..	155	0
powder .... ,,	165	0	..	170	0	170	0	..	175	0
Ammonia:										
Carbonate ......per lb.	0	5¾	..	0	6	0	5	..	0	5¼
Hydrochlorate, crude, white........ per ton	540	0	..	0	0	420	0	..	500	0
British (*see* Sal Ammoniac)										
Muriate (*see* Hydrochlorate)										
Sulphate ......per ton	330	0	..	340	0	280	0	..	290	0
Argol, Cape ......per cwt	70	0	..	80	6	65	0	..	75	0
France .... ,,	45	0	..	60	0	48	0	..	70	0
Oporto, red ,,	24	0	..	25	0	26	0	..	28	0
Sicily .... ,,	45	0	..	50	0	50	0	..	55	0
Naples, white ,,	55	0	..	65	0	60	0	..	70	0
Florence, white	70	0	..	75	0	75	0	..	80	0
,, red ,,	60	0	..	65	0	65	0	..	70	0
Bologna, white ,,	0	0	..	0	0	78	0	..	80	0
Ashes (*see* Potash and Soda)										
Bleaching powd..per cwt.	10	6	..	10	9	13	0	..	13	6
Borax, crude .... ,,	25	0	..	40	0	25	0	..	35	0
(Tincal) .. ,,	40	0	..	58	0	35	0	..	52	6
British refnd. ,,	66	0	..	67	0	50	0	..	52	6
Calomel ....per lb.	2	5	..	0	0	2	5	..	0	0
Copper:										
Sulphate ......per cwt.	24	0	..	25	0	24	6	..	25	0
Copperas, green ..per ton	52	6	..	60	0	55	0	..	60	0
CorrosiveSublimate..p.lb.	1	11	..	0	0	1	11	..	0	0
Cr. Tartar, French, p. cwt.	89	6	..	90	0	78	0	..	80	0
Venetian grey ,,	70	0	..	0	0	0	0	..	0	0
brown ,,	62	6	..	65	0	55	0	..	60	0
Epsom Salts ....per cwt.	8	0	..	8	6	8	0	..	9	0
Glauber Salts .... ,,	5	6	..	6	0	5	6	..	6	0
Lime:										
Acetate, white, per cwt.	12	6	..	21	6	13	0	..	22	0
Magnesia:										
Carbonate...... ,,	42	6	..	0	0	42	6	..	0	0
Potash:										
Bichromate ....per lb.	0	5	..	0	0	0	5	..	0	5¼
Carbonate:										
Potashes, Canada, 1st sort ......per cwt.	32	0	..	0	0	33	0	..	0	0
Pearlashes, Canada, 1st sort ......per cwt.	32	0	..	0	0	34	0	..	35	0
Chlorate ....per lb.	1	0	..	0	0	1	0	..	0	0
Hydriodate (*see* Potassium, Iodide)										
Muriate (*see* Potassium, Chloride)										
Prussiate ......per lb.	0	11¾	..	1	0	1	0	..	1	1
red .... ,,	1	9½	..	1	10	1	9½	..	1	10
Tartrate (*see* Argol and Cream of Tartar)										
Potassium:										
Chloride ......per cwt.	8	0	..	0	0	8	0	..	8	6
Iodide.......... per lb.	12	0	..	0	0	11	9	..	0	0
Quinine:										
Sulphate, British, in bottles ...... per oz.	5	9	..	0	0	4	3	..	4	6
Sulphate, French ,,	5	3	..	0	0	4	0	..	4	1
Sal Acetos ....per lb.	0	10	..	0	10½	0	10½	..	0	0
Sal Ammoniac, Brit. cwt.	36	0	..	38	0	35	0	..	37	0
Saltpetre:										
Bengal, 6 per cent. or under ......per cwt.	25	9	..	26	3	19	0	..	19	6
Bengal, over 6 per cent. per cwt.	24	9	..	25	6	18	3	..	19	0
Madras ... . ,,	0	0	..	0	0	18	0	..	18	6
Bomb & Kurrachee p.ct.	0	0	to	0	0	18	0	to	18	0
European...... ,,	0	0	..	0	0	21	6	..	22	6
British, refined ,,	28	0	..	29	0	22	9	..	23	6

	1869.					1868.				
	s.	d.		s.	d.	s.	d.		s.	d.
Soda: Bicarbonate, p.cwt.	10	9	..	0	0	13	6	..	0	0
Carbonate:										
Soda Ash....per deg.	0	1⅞	..	0	2	0	2⅛	..	0	2¼
Soda Crystals per ton.	82	6	..	0	0	95	0	..	0	0
Hyposulphite..per cwt.	18	0	..	22	0	22	0	..	0	0
Nitrate .... ,,	16	9	..	17	0	11	0	..	12	6
Sugar of Lead, White, cwt.	40	0	..	42	0	37	6	..	38	0
Brown .... ,,	29	0	..	30	0	28	0	..	29	0
Sulphur (*see* Brimstone										
Verdigris .... per lb.	0	11	..	1	1	0	11	..	1	0
Vermilion, English..per lb.	2	6	..	3	0	2	9	..	3	1
China.... ,,	2	9	..	3	0	2	9	..	3	0
DRUGS.										
Aloes, Hepatic....per cwt.	80	0	..	180	0	90	0	..	180	0
Socotrine .. ,,	120	0	..	240	0	180	0	..	340	0
Cape, good.. ,,	29	0	..	32	0	30	0	..	32	0
Inferior ,,	16	0	..	28	0	18	0	..	29	0
Barbadoes ,,	70	0	..	190	0	75	0	..	220	0
Ambergris, grey ....per oz.	27	6	..	32	6	32	0	..	35	0
BALSAMS—										
Canada .... per lb.	1	3	..	0	0	1	5	..	1	6
Capivi .... ,,	2	0	..	0	0	1	8	..	1	9
Peru .... ,,	11	0	..	12	0	8	0	..	0	0
Tolu .... ,,	2	3	..	0	0	2	7	..	0	0
BARKS—										
Canella alba ....per cwt.	30	0	..	45	0	22	0	..	27	0
Cascarilla........ ,,	30	0	..	40	0	23	0	..	35	0
Peru, crown & grey per lb.	0	10	..	1	11	1	0	..	2	0
Calisaya, flat ,,	3	0	..	3	6	2	6	..	2	9
quill ,,	2	10	..	3	4	2	3	..	2	6
Carthagena ,,	0	10	..	1	9	0	9	..	1	3
Pitayo .... ,,	0	9	..	1	5	1	0	..	1	3
Red ...... ,,	3	0	..	9	0	1	6	..	6	0
Bucho Leaves ...... ,,	0	4	..	0	7	0	2½	..	0	9
Camphor, China.. per cwt.	110	0	..	115	0	140	0	..	0	0
Japan ,,	120	0	..	0	0	137	6	..	0	0
Refin Eng. per lb.	1	8	..	0	0	1	10	..	11	0
Cantharides ...... ,,	2	2	..	0	0	1	10	..	2	0
Chamomile Flowers p. cwt	60	0	..	100	0	45	0	..	80	0
Castoreum .... per lb.	5	0	..	32	0	5	0	..	32	0
Dragon's Blood, reed p. ct.	100	0	..	220	0	90	0	..	220	0
lump ,,	100	0	..	200	0	100	0	..	240	0
FRUITS AND SEEDS (*see also* Seeds *and* Spices)										
Anise, China Star pr cwt.	97	6	..	100	0	115	0	..	120	0
German, &c. ,,	30	0	..	40	0	28	0	..	40	0
Beans, Tonquin .. per lb.	1	1	..	1	6	1	0	..	1	6
Cardamoms, Malabar good ,,	7	9	..	8	3	7	9	..	9	0
inferior ,,	5	6	..	7	0	5	3	..	7	6
Madras ,,	4	6	..	8	6	4	6	..	8	0
Ceylon ,,	2	9	..	3	0	2	6	..	3	0
Corozo Nuts.... per cwt.	15	0	..	18	0	12	0	..	18	0
Cassia Fistula.. ,,	15	0	..	28	0	20	0	..	32	0
Castor Seeds .. ,,	11	0	..	13	0	10	0	..	12	0
Cocculus Indicus ,,	26	0	..	28	0	35	0	..	37	6
Colocynth, apple.. per lb.	0	6	..	0	10	0	7	..	0	11
Croton Seeds .. per cwt.	65	0	..	75	0	97	6	..	115	0
Cubebs .... ,,	42	0	..	0	0	40	0	..	45	0
Cummin........ ,,	38	0	..	50	0	16	0	..	20	0
Dividivi .... ,,	10	6	..	12	6	11	0	..	13	0
Fenugreek...... ,,	9	0	..	14	0	11	0	..	12	0
Guinea Grains .. ,,	38	0	..	40	0	45	0	..	48	0
Juniper Berries ,,	7	0	..	8	0	9	0	..	10	0
Myrobalans .... ,,	10	0	..	17	0	13	0	..	19	0
Nux Vomica.... ,,	10	0	..	13	0	18	0	..	20	0
Tamarinds, East India ,,	26	0	..	28	0	22	0	..	32	6
West India, new ,,	16	0	..	30	0	30	0	..	42	0
Vanilla, large .... per lb.	14	0	..	18	0	9	0	..	14	0
inferior ,,	8	0	..	12	0	4	0	..	8	0
Wormseed per cwt.	25	0	..	30	0	1	6	..	0	0
Ginger, Preserved, in bond (duty 1d. per lb.) per lb.	0	6	..	0	10	0	9	..	0	10
Gums (*see separate list*)										
Honey, Narbonne ,,	0	0	..	0	0	0	0	..	0	0
Cuba .... ,,	21	0	..	36	0	25	0	..	38	0
Jamaica.. ,,	25	0	..	45	0	22	0	..	42	0
Ipecacuanha .... ,,	7	6	..	7	10	6	6	..	6	9
Isinglass, Brazil . ,,	3	1	..	4	4	2	2	..	4	0
Tongue sort ,,	3	3	..	5	0	2	10	..	4	0
East India ,,	2	3	..	4	0	2	0	..	4	0
West India ,,	3	8	..	4	0	3	6	..	4	0
Russ. long staple	8	0	..	9	0	9	0	..	10	0
,, leaf ,,	5	0	..	7	6	6	0	..	9	0
,, Simovia	1	6	..	2	6	1	6	..	2	6
Jalap, good ...... ,,	3	4	..	4	3	4	3	..	5	0
infer. & stems ,,	0	6	..	3	2	0	9	..	3	10
Lemon Juice ... per degree	0	1	..	0	1⅛	0	0¾	..	0	0
Liquorice, Spanish per cwt.	63	0	..	68	0	65	0	..	70	0
Italian ,,	48	0	..	67	0	50	0	..	60	0
Manna, flaky .... ,,	3	0	..	3	6	3	6	..	0	0
small...... per lb.	1	3	..	1	9	1	10	..	0	0
Musk.............. per oz.	20	0	..	36	0	22	0	..	41	0
OILS (*see also separate List*)										
Almond, expressed per lb.	1	3	..	0	0	1	0	..	0	0
Castor, 1st pale .... ,,	0	5¾	..	0	6	1	7	..	0	
second .... ,,	0	5¼	..	0	5½	0	6½	..	0	6¾
infer. & dark ,,	0	4¾	..	0	5	0	6¼	..	0	
Bombay (in casks)	0	4½	..	0	0	0	5¼	..	0	5½
Cod Liver ......per gall.	4	0	..	6	3	4	6	..	5	6
Croton............per oz.	0	3	..	0	4	1	2	..	1	6
Essential Oils:										
Almond ....per lb.	40	0	..	0	0	40	0	..	9	0
Anise-seed ...... per lb	9	6	to	9	9	8	6	to	9	0
Bay ....per cwt.	70	0	..	80	0	80	0	..	90	0
Bergamot ......per lb.	11	0	..	18	0	7	6	..	16	0
Cajeput, (in bond) per oz.	0	1¾	..	0	2	0	2	..	0	2¼

	1869.					1868.				
Essential Oils, *continued:*—	s.	d.		s.	d.	s.	d.		s.	d.
Caraway ....per lb.	5	3	..	6	0	5	0	..	6	6
Cassia .... ,,	5	6	..	5	6	5	6	..	5	9
Cinnamon ......per oz.	1	0	..	4	0	1	3	..	3	6
Cinnamon-leaf .. ,,	0	6	..	0	0	0	5	..	0	7
Citronelle ...... ,,	0	2½	..	0	0	0	2¾	..	0	3
fine.... ,,	0	3½	..	0	0	0	4	..	0	0
Clove............per lb.	2	9	..	0	0	2	6	..	0	0
Juniper .... ,,	1	9	..	2	0	1	9	..	2	0
Lavender........ ,,	2	9	..	3	9	2	9	..	3	9
Lemon.......... ,,	4	6	..	8	0	4	6	..	8	0
Lemongrass ....per oz.	0	4½	..	0	5	0	6	..	0	7
Neroli .... ,,	0	0	..	0	0	3	6	..	4	6
Nutmeg .... ,,	0	4	..	0	7	0	3	..	0	9
Orange..........per lb.	5	0	..	8	0	5	0	..	7	0
Otto of Roses....per oz.	15	0	..	20	0	16	0	..	20	0
Peppermint:										
American ....per lb.	19	0	..	20	0	21	6	..	21	6
English ...... ,,	38	0	..	43	0	35	0	..	43	0
Rosemary ...... ,,	1	9	..	2	0	1	9	..	2	0
Sassafras........ ,,	3	6	..	4	0	3	0	..	3	3
Spearmint ...... ,,	4	6	..	18	0	16	0	..	25	0
Thyme.......... ,,	1	10	..	4	0	2	0	..	4	0
Mace, expressed .. per oz.	0	0¾	..	0	2½	0	2¼	..	0	2½
Opium, Turkey ...... per lb.	40	0	..	44	0	19	0	..	20	0
inferior ...... ,,	29	0	..	38	0	0	0	..	0	0
Quassia (bitter wood) per ton	120	0	..	130	0	100	0	..	105	0
Rhubarb, China, good and fine ....per lb.	4	6	..	7	6	6	0	..	8	0
Good, mid. to ord. ,,	0	8	..	3	9	1	6	..	5	0
Dutch trimmed ,,	0	0	..	0	0	10	0	..	12	0
Russian .... ,,	0	0	..	0	0	9	0	..	10	0
ROOTS—										
Calumba ....per cwt.	40	0	..	50	0	20	0	..	35	0
China .... ,,	27	0	..	33	0	30	0	..	35	0
Galangal .... ,,	13	0	..	18	0	16	0	..	17	0
Gentian .... ,,	19	0	..	20	0	16	0	..	17	0
Hellebore ...... ,,	22	0	..	30	0	6	0	..	0	0
Orris............ ,,	38	0	..	44	0	36	0	..	40	0
Pellitory .... ,,	58	0	..	60	0	58	0	..	60	0
Pink..............per lb.	0	6	..	0	9	0	9	..	0	11
Rhatany .... ,,	0	6	..	0	10	0	6	..	0	10
Sencka............ ,,	1	11	..	0	0	1	6	..	0	0
Snake .... ,,	1	3	..	0	0	1	9	..	2	0
Saffron, Spanish .. ,,	27	0	..	34	0	30	0	..	34	0
Salep ....per cwt.	110	0	..	120	0	100	0	..	120	0
Sarsaparilla, Lima per lb.	0	7	..	0	8	0	0	..	0	0
Para.............. ,,	1	0	..	1	3	0	0	..	0	0
Honduras .... ,,	1	0	..	1	6	0	10	..	1	4
Jamaica .... ,,	1	4	..	2	6	1	0	..	2	1
Sassafras ....per cwt.	14	0	..	15	0	10	0	..	0	0
Scammony, Virgin ..per lb.	28	0	..	35	0	28	0	..	36	0
second & ordinary ,,	10	0	..	23	0	11	0	..	23	0
Senna. Bombay .... ,,	0	3	..	0	5½	0	2	..	0	3½
Tinnivelly .... ,,	0	2	..	1	0	0	2	..	0	10
Alexandria........ ,,	0	10	..	1	8	0	5	..	0	10
Spermaceti, refined.. ,,	1	5	..	0	0	1	6	..	0	0
American .... ,,	1	4	..	0	0	1	5	..	0	0
Squill.............. ,,	0	1	.	0	2¼	0	1	..	0	2½

GUMS.

Ammoniac, drop ..per cwt.	220	0	..	260	0	180	0	..	220	0
lump .. ,,	140	0	..	240	0	120	0	..	160	0
Animi, fine washed ,,	300	0	..	330	0	210	0	..	230	0
bold scraped ,,	200	0	..	280	0	150	0	..	210	0
sorts ...... ,,	110	0	..	180	0	100	0	..	130	0
dark ...... ,,	104	0	..	110	0	70	0	..	100	0
Arabic, E. I., fine pale picked .. ,,	77	0	..	83	0	83	0	..	85	0
srts, gd. to fin ,,	64	0	.	74	0	75	0	..	90	0
garblings.. ,,	40	0	..	60	0	45	0	..	63	0
Turkey, pick. gd to fin. ,,	180	0	..	220	0	170	0	..	210	0
second & inf. ,,	90	0	..	175	0	85	0	..	160	0
in sorts .. ,,	75	0	..	110	0	65	0	..	80	0
Gedda.... ,,	44	0	..	52	0	38	0	..	40	0
Barbary, white .. ,,	80	0	..	100	0	70	0	..	80	0
brown .. ,,	74	0	..	78	0	68	0	..	72	0
Australian ...... ,,	35	0	..	42	0	38	0	..	48	0
Assafœtida, com. to gd ,,	75	0	..	110	0	55	0	..	90	0
Benjamin, 1st qual. ,,	340	0	..	540	0	380	0	..	660	0
2nd ,, ,,	140	0	..	220	0	140	0	..	240	0
3rd ,, ,,	51	0	..	120	0	70	0	..	120	0
Copal, Angola, red ,,	95	0	..	102	0	60	0	..	70	0
Benguela .. ,,	95	0	..	105	0	70	0	..	85	0
Sierra Leone..per lb.	0	6	..	1	1	0	6	..	1	2
Manilla ....per cwt.	32	0	..	47	0	27	0	..	46	0
Dammar, pale .... ,,	90	0	..	97	6	85	0	..	90	0
Euphorbium ...... ,,	18	0	..	20	0	13	0	..	19	0
Galbanum .... ,,	200	0	..	240	0	240	0	..	280	0
Gamboge, pckd pipe ,,	300	0	..	340	0	480	0	..	700	0
in sorts.. ,,	0	0	..	0	0	0	0	..	0	0
Guaiacum ....per lb.	0	8	..	1	4	0	6	..	2	0
Kino..............per cwt.	60	0	..	120	0	100	0	..	150	0
Kowrie, rough.... ,,	46	0	..	50	0	35	0	..	40	0
scraped .. ,,	50	0	..	100	0	42	6	..	75	0
Mastic, picked......per lb.	5	0	..	6	0	5	0	..	6	0
Myrrh, gd. & fine per cwt.	190	0	..	240	0	160	0	..	200	0
sorts......	100	0	..	190	0	100	0	..	170	0
Olibanum, p. sorts	75	0	..	80	0	80	0	..	85	0
amber & ylw.	62	0	..	70	0	70	0	..	80	0
garblings.... ,,	25	0	..	45	0	27	0	..	45	0
Senegal ....per cwt.	80	0	..	85	0	80	0	..	90	0
Sandarac .... ,,	82	0	..	105	0	85	0	..	100	0
Thus.............. ,,	13	0	to	14	0	12	0	o	0	0
Tragacanth, leaf.. ,,	230	0	..	360	0	240	0	..	280	0
in sorts ,,	120	0	..	230	0	160	0	..	220	0

OILS.

	1869.					1868.				
	£	s.		£	s.	£	s.		£	s.
Seal, pale..........per tun	36	10	..	0	0	38	0	..	40	10
yellow to tinged ,,	33	0	..	35	0	35	0	..	38	
brown........ ,,	31	0	..	32	0	33	0	..	34	0
Sperm, body ...... ,,	104	0	..	0	0	98	0	..	100	0
headmatter ,,	0	0	..	0	0	0	0	..	0	0
Cod................ ,,	42	10	..	43	0	36	0	..	0	0
Whale, South Sea, pale ,,	38	0	..	0	0	36	0	..	0	0
yellow ,,	37	0	..	0	0	35	0	..	37	0
brown ,,	33	0	..	0	0	34	0	..	0	0
East India, Fish ,,	31	0	..	32	0	35	0	..	0	0
Olive, Galipoli ...... ,,	53	0	..	0	0	73	0	..	0	0
Trieste ...... ,,	52	0	..	0	0	72	0	..	73	0
Levant ...... ,,	47	0	..	48	0	67	0	..	70	0
Mogador...... ,,	46	0	..	0	0	66	0	..	0	0
Spanish ...... ,,	49	0	..	0	0	70	0	..	0	0
Sicily .... ,,	49	0	..	0	0	70	0	..	0	0
Cocoanut, Cochin.. per ton	48	0	..	0	0	54	0	..	0	0
Ceylon .. ,,	46	0	..	0	0	50	0	..	0	0
Sydney ,,	40	0	..	45	0	42	0	..	50	0
Ground Nut and Gingelly:										
Bombay	0	0	..	0	0	50	0	..	0	0
Madras................	35	0	..	36	0	50	0	..	55	0
Palm, fine	41	0	..	42	0	39	10	..	40	0
Linseed	29	0	..	30	0	34	10	..	0	0
Rapeseed, English, pale ..	35	0	..	0	0	38	0	..	0	0
brown........	33	0	..	0	0	36	0	..	0	0
Foreign pale....	36	0	..	0	0	39	10	..	40	0
brown........	33	10	..	0	0	37	0	..	0	0
Cottonseed	26	10	..	32	0	33	0	..	0	0
Lard......................	76	0	..	78	0	72	0	..	0	0
Tallow	37	0	..	38	0	36	0	..	38	0
Turpentine, American, cks.	31	0	..	0	0	35	0	..	0	0
Petroleum, Crude	14	0	..	15	0	10	0	..	11	0
	s.	d.		s.	d.	s.	d.		s.	d.
refined, per gall.	1	10	..	1	11	1	3	..	0	0
Spirit ,,	0	9	..	0	0	1	1	..	1	3

SEEDS.

	s.	d.		s.	d.	s.	d.		s.	d.
Canary ....per qr.	60	0	..	65	0	50	0	..	70	0
Caraway, English per cwt.	36	0	..	38	0	44	0	..	46	0
German, &c.....	32	0	..	44	0	40	0	..	48	0
Coriander	20	0	..	22	0	15	0	..	17	0
Hemp ....per qr.	42	0	..	44	0	42	0	..	44	0
Linseed, English per qr ..	65	0	..	72	0	0	0	..	0	0
Black Sea & Azof	58	0	..	0	0	65	0	..	0	0
Calcutta ,,	58	6	..	0	0	64	6	..	0	0
Bombay ,,	59	6	..	0	0	64	6	..	0	0
St. Petrsbrg. ,,	57	0	..	57	6	0	0	..	0	0
Mustard, brown..per bshl.	14	0	..	17	0	15	0	..	16	0
white.. ,,	13	0	..	18	0	10	0	..	12	0
Poppy, East India per qr,	62	0	..	0	0	56	0	..	0	0

SPICES.

Cassia Lignea ....per cwt.	130	0	..	140	0	116	0	..	120	0
Vera .... ,,	50	0	..	90	0	50	0	..	70	0
Buds .... ,,	140	0	..	160	0	160	0	..	180	0
Cinnamon, Ceylon,										
1st quality ....per lb.	2	0	..	3	10	1	11	..	2	6
2nd do. ...... ,,	1	9	..	3	0	1	6	..	2	3
3rd do. ...... ,,	1	8	..	3	0	1	4	..	2	2
Tellicherry ...... ,,	0	0	..	0	0	0	0	..	0	0
Cloves, Penang.... ,,	0	10	..	0	11¼	0	10	..	1	0
Amboyna........ ,,	0	5	..	0	6	0	4¾	..	0	5
Zanzibar .... ,,	0	4	..	0	4½	0	3⅛	..	0	3½
Ginger, Jam, fine per cwt.	90	0	..	200	0	100	0	..	150	0
Ord. to good .. ,,	35	0	..	80	0	40	0	..	95	0
African.......... ,,	26	0	..	26	6	29	0	..	0	0
Bengal .... ,,	30	0	..	0	0	30	0	..	0	0
Malabar .... ,,	0	0	..	0	0	33	0	..	0	0
Cochin .... ,,	32	0	..	120	0	40	0	..	110	0
Pepper, Blk. Malabar, per lb.	0	5	..	0	5¼	0	4¼	..	0	5
White, Tellicherry ,,	0	10	..	1	6	0	9	..	1	9
Cayenne .... ,,	0	4	..	0	8½	0	6	..	0	8

VARIOUS PRODUCTS.

COCHINEAL—										
Honduras, black ..per lb.	3	1	..	4	5	3	3	..	4	6
,, silver .. ,,	2	11	..	3	6	3	1	..	3	10
,, pasty .. ,,	1	6	..	2	10	1	9	..	3	0
Mexican, black .... ,,	3	0	..	3	3	3	2	..	3	5
,, silver .... ,,	2	11	..	3	1	2	10	..	3	0
Teneriffe, black....	3	1	..	4	10	3	2	..	4	1
,, silver.... ,,	2	11	..	3	4	3	0	..	3	6
PUMICE STONE ..per ton	120	0	..	160	0	120	0	..	160	0
SOAP, Castile ....per cwt.	38	0	..	39	0	38	0	..	40	0
SPONGE, Turk. fin pkd pr lb.	12	0	..	15	0	12	0	..	14	0
Fair to good .. ,,	5	0	..	11	0	5	0	..	0	0
Ordinary...... ,,	2	0	..	4	0	2	0	..	0	0
Bahama.............. ..	0	6	..	2	3	0	8	..	1	9
TERRA JAPONICA—										
Gambier .. per cwt.	17	6	..	17	9	16	6	..	17	0
Free cubes ,,	21	0	..	24	0	25	0	..	27	0
Cutch ..... ,,	30	0	..	32	0	52	6	..	55	6
WOOD, Dye, Bar ..per ton	£5	0	..	£5	10	4	0	..	4	10
Brazil .... ,,	0	0	..	0	0	35	0	..	85	0
Braziletto .... ,,	0	0	..	0	0	0	0	..	0	0
Cam .... ,,	23	0	..	26	0	24	0	..	28	6
Fustic, Cuba...... ,,	7	15	..	8	15	7	10	..	8	5
Jamaica .... ,,	5	15	..	7	5	6	10	..	7	0
Savanilla........ ,,	6	0	..	6	5	6	0	..	6	5
Logwood, Campeachy ,,	9	10	..	10	10	9	0	..	10	0
Honduras ...... ,,	0	0	..	0	0	4	5	..	4	10
St. Domingo .... ,,	6/10	0	..	7	0	4	10	..	0	0
Jamaica .... ,,	6/10	0	..	7	0	4	10	..	4	15
Lima, first pile.... ,,	14	0	..	15	0	25	0	..	26	0
Red Sanders...... ,,	7/2/6		..	7	5	6/12/6		..	6	15
Sapan, Bimas, &c. ,,	9	0	..	11	10	9	10	..	13	0